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BRACKEN AS A SOURCE OF POTASH.

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CONSIDERABLE attention has been directed to the possibility of extracting potash from bracken, and it has been urged that the operation would have the double advantage of increasing the supplies of potash, and of eradicating bracken from land where it is not wanted.

A number of analyses have recently been made in England, Scotland and Wales, which throw important light on the matter and indicate the limitations to which the proposal is subject.

It has been clearly shown that the amount of potash in bracken depends on the stage of growth of the plant. In the early stages potash is the predominating constituent of the ash of the leaves and stems. If it were practicable to collect only the young shoots and burn them, a tolerably pure potassium salt could be obtained without difficulty. As the plant grows bigger it goes on taking up more potash from the soil, but it takes up increasing amounts of other things as well, so that the percentage of potash in the ash falls off. Thus the ash of the young shoots collected in May or early June contains as much as 50 to 56 per cent. of potash (reckoned as K_2O), but this proportion steadily falls off as the plant grows older, till in the full-grown plant the amount of potash in the ash may be below 30 per cent. As, however, the plant is growing all the time, its total content of potash rises till

growth is finished, in spite of this fall in percentage; thus, while the young shoots may yield only 20 lb. of potash per acre the old ones may give 200 lb. or more. When the plant dies and shrivels, however, the potash becomes lost; some of it may go back to the root, and some is washed away by the rain. The loss continues so long as the bracken is exposed to the weather, and finally bracken that has lain out all through the winter becomes very poor in potash, and may contain only 2 per cent.

Thus, there are three general rules governing the amount of potash obtainable from the ash of bracken :—

1.—Young bracken yields the purest ash, more than half being pure potash (K_2O). Unfortunately, it does not yield much per acre.

2.—Fully-grown bracken yields a less pure ash, containing large quantities of other substances besides potash—

TABLE I.—*Percentage of total Potash* (K_2O) *soluble in Hydrochloric Acid in the Ash of Bracken at various Stages of the Plant Growth.*

	S.W. Scotland (Ayrshire).			*North Wales.**					*Rothamsted.*
—	Dundonald Glen.	Shewalton Moss.	Clevance.	Aber (loam)	Maes Mynan (sand)	Gors Wen. (loam)	Bodafon (medium (loam)	Ty Engan* (sand)	Harpenden Common.
1916. Young plant, 1st May	56	54	..	..	..	..	..	..	..
„ „ (1st June)	53	45	55	51·2	..	..	..	..	53·8
Older plant (1st July)	47	42	48	38·6	..	..	..	..	47·2
„ „ (1st Aug.)	42	30	45	32·0	26·4	29·7	34·9	27·6	40·6
Fully grown (1st Sept.)	37	22	40	..	..	..	..	..	34·0
Fully grown (12th Sept.)	..	..	..	..	..	..	..	..	29·4
Fully grown (Oct.)	21	10	10	..	..	..	..	..	..
Dead bracken—withered leaves collected in summer	..	..	..	2·05	..	..	..	..	..
Withered stems collected in summer	..	..	..	20·5	..	..	..	..	..
Leaves and stems collected at end of winter	..	..	..	..	..	..	..	..	2

* Details of the Localities and Soils from which samples were taken:

College Farm, Aber, near Bangor.—Hill pasture lying about 800 ft. above sea level. Soil, a shaley loam. This type of soil generally contains from 0·7 to 0·8 per cent. of K_2O soluble in strong HCl. Samples were taken on 1st June, 1st July, and 25th July. Samples were also examined of the stems and the leaves respectively of the withered bracken taken from the hill in November.

Maes Mynan, Caerwys.—Rough hill pasture on the sides of the Alyn valley. Soil, a glacial sand. These glacial sands contain [illegible] to 0·35 per cent. of K_2O soluble in strong HCl.

Gors Wen, nr. Conway.—Conway valley. Loam over shale similar to the Aber soil.

Bodafon, nr. Moelfre, Anglesey.—Soil, mixed drift, old Red Sandstone and Schist origin. Such soils contain from 0·45 to 0·[illegible] per cent. of K_2O soluble in strong HCl.

Ty Engan, Sarn, Pwllheli.—Thin, sandy soil from adjoining field, 0·41 per cent.

only about one-third is potash. It yields so much more per acre, however, that the total quantity of potash per plant and per acre is greater than in the case of the young plant.

3.—Dried bracken rapidly loses its potash on exposure to the weather, till finally bracken left out all the winter may on burning yield an ash containing only 2 per cent. of pure potash.

Determinations of Potash in 1916.—During the season of 1916 a number of determinations were made of the amounts of potash in bracken ash at the Rothamsted Experimental Station, the Glasgow and West of Scotland Agricultural College, the Agricultural Department of the University College of North Wales, Bangor, and the Fruit and Cider Institute at Long Ashton, Bristol. These show in the early stages of growth considerable, indeed remarkable, similarity in potash content. The results are given in Table I.

Long Ashton (Bristol).

Samples Cut.	Dry Matter. Per cent.	Ash in Dry Matter. Per cent.	Potash in Ash. Per cent.	Potash in dry Matter. Per cent.
May 29th–31st (fronds 6 in. to 8 in. high) ..	17·13	7·02	53·71	3·77
July 1st	—	5·15	44·94	2·32
August 1st	—	6·23	37·12	2·32
September 6th	—	7·14	33·12	2·37

(May samples analysed by C. T. Gimingham; later samples analysed at Rothamsted.)

In this Table the percentages given are those extracted by hydrochloric acid. Almost all of the potash, however, is soluble in water; at Bristol 99 per cent. is so soluble, in Ayrshire over 90 per cent., and in the Welsh experiments the proportion varies from 50 per cent. in the exceptional case of Maes Mynan and 80 per cent. at Ty Engan, to the more usual 95 per cent. at Aber and Gors Wen.

The amounts of total potash in the bracken ash at Dundonald Glen, Clevance and Harpenden Common are very similar; in all cases the soil is mainly mineral and without peat. Dundonald Glen has a deep fertile soil, Clevance a shallow soil in an exposed position on the side of a hill. The analyses of the Harpenden Common samples were made at Rothamsted; the Common soil is mainly gravel and clay. The bracken on

B 2

Shewalton Moss, which has 6 or 7 ft. of peat, begins in May with 54 per cent. of potash like the others. but other constituents are taken up so quickly that the proportion falls more rapidly. The North Wales soils show a similar rapid drop.

The North Wales results indicate that bracken from sandy soil contains less potash in its ash than bracken from loamy soils; Maes Mynan and Ty Engan both being sands, containing 0·3 to 0·45 per cent. of total potash,* while Gors Wen, Aber and Bodafon are loams, the first containing 0·7 to 0·8 per cent. of total potash, while a field adjacent to the last contains 0·6 per cent. The result may be associated with the lower content of potash in sandy soils. Maes Mynan gave by far the most luxuriant crop, but the charred residue showed the abnormal property of bursting into flames when it was heated.

Assuming that the potash is worth 10s. per unit—an estimate possibly on the low side, seeing that 90 per cent. is soluble in water—then the following would be the value of 1 ton of bracken ash collected at various times :—

—	*Ayrshire.*			*North Wales.*					*Rothamsted.*
	Dundonald Glen.	Shewalton Moss.	Clevance.	Aber.	Maes Mynan.	Gors Wen.	Bodafon.	Ty Engan.	Harpenden Common.
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
Young plant (24th May	28 0	27 0	..	..	..	..	..	..	..
Young plant (1st June)	26 10	22 10	27 10	25 10	..	..	..	..	27 0
Older plant (1st July)	23 10	21 0	24 0	19 10	..	..	..	..	23 10
Fully grown (1st Aug.)	21 0	15 0	22 10	16 0	13 0	15 0	17 10	14 0	20 5
Fully grown (1st Sept.)	18 10	11 0	20 0	..	..	..	..	..	17 0
Fully grown (Oct.)	10 10	5 0	5 0	..	..	..	..	..	14 10
Dead plant ..	..	..	..	..	..	..	..	..	about £1

At first sight these figures seem very attractive, but, as anyone who tries it soon realises, the collection of a ton of bracken ash in a dry state is no simple matter. A clearer notion of the value of bracken as a source of potash is obtained by estimating the quantity of potash obtained from an acre of ground.

The Quantity of Potash obtainable per Acre.—None of the measurements extends over a whole acre, and an estimate can only be obtained by multiplying up the measurements made on

* [illegible]

a few square yards. The figures are approximations only, and are to be taken simply as numbers for guidance.

The quantity of ash obtained in lb. per acre is given in Table II., from which it appears that 4 to 10 acres of bracken have to be cut to yield 1 ton of bracken ash. The experimenters agree that 7 to 10 acres would be typical of considerable areas of bracken in the country.

TABLE II.—*Approximate Quantity of Ash in lb. per Acre obtained by burning Bracken.*

—	Dun-donald Glen.	She-walton Moss.	Cle-vance.	Scotch Bd. of Agric. estimate.	Har-penden Common.
May	41	36	..	..	..
June	287	296	16	..	24
July	556	562	111	..	67
August	678	642	236	224-560	138
September	601	403	323	..	200
October	186	132	193	..	..

These figures, combined with those for the percentages of potash in the ash already given, tell us the weight of potash obtainable from an acre of bracken; these are given in Table III.

TABLE III.—*Potash obtained in lb. per Acre from Bracken Ash.*

—	*S.W. Scotland, Ayrshire.*			*Rothamsted.*
	Dundonald Glen.	Shewalton Moss.	Clevance.	Harpenden Common.
Young plants, 24th May	23	19	..	..
,, ,, 1st June ..	152	132	9	13
Older plant, 1st July ..	264	239	53	32
Fully grown, 1st August	289	204	106	56
,, ,, 1st September	225	88	130	60
,, ,, 12th ,,	..	..	..	60
,, ,, October ..	40	13	20	..
Dead bracken collected at end of winter ..	..	..	..	about 5

Estimate for North Wales Centre.

	Maximum Growth.		K_2O, *lb. per acre.*
Maes Mynan	100	....	90
Aber	60	....	180
Gors Wen	60	....	100
Bodafon	60	....	120
Ty Engan	40	....	52

From this table it is evident that much less potash is obtainable from an acre of bracken on Harpenden Common than in Ayrshire, but even in Ayrshire the amount is very variable. If cut in July or August, Dundonald Glen and Shewalton Moss would yield 2–2½ cwt. of K_2O per acre. Assuming as before that the potash is worth 10s. per unit the value of the ash obtainable from an acre of ground would be £5 at Dundonald and Shewalton, £2 10s. at Clevance, and 27s. 6d. at Harpenden Common, provided always, of course, that the whole of the ash is collected and kept dry throughout. The bulk of the potash is in the form of sulphate, chloride and carbonate—salts which are easily soluble in water. Rain, therefore, has a disastrous effect on the ash, reducing the amount of potash. If the ash is not collected at once, or if it is allowed to become wet or to be washed out by rain, it loses considerably in value.

Another estimate has been published by the Scotch Board of Agriculture.* One acre of bracken is estimated to yield 2 cwt. of ash when growth is sparse, and up to 5 cwt. when growth is thick and vigorous. The potash content of the ash varies between 30 and 40 per cent.; the value of the ash would run from £18 to £25 per ton when potash is 12s. 6d. per unit, or £14 8s. to £20 when the unit price is 10s, as we have previously assumed. The amount of potash obtained per acre is estimated to vary from about 70 to about 220 lb.

The Amount of Ash obtainable from a Ton of Bracken.—Table IV. shows the amount of dry matter and of ash in the bracken as collected. The dry matter in the bracken as it reaches the

TABLE IV.—*Dry Matter and percentage of Ash in Bracken. West of Scotland.*

Monthly Samplings, 1916.	Dry Matter in Fresh Bracken Percentages.			Percentage Ash in Dry Matter.		
	Dundonald Glen.	Shewalton Moss.	Clevance.	Dundonald Glen.	Shewalton Moss.	Clevance.
May	8·0	8·5	—	9·4	9·1	—
June	15·5	23·6	11·3	7·2	6·1	9·3
July	21·5	27·4	23·9	6·4	5·0	6·1
August ..	26·1	31·2	28·9	6·3	5·1	6·3
September ..	28·4	38·8	31·3	6·1	4·7	6·4
October ..	73·9	64·4	58·4	3·5	3·0	4·7

* Leaflet No. 39, Scotch Board of Agriculture.

Monthly Samplings, 1916.	Percentage Potash (K_2O) in					
	Fresh Bracken.			Dry Bracken.		
	Dundonald Glen.	Shewalton Moss.	Clevance.	Dundonald Glen.	Shewalton Moss.	Clevance.
May	0·42	0·44	—	5·26	4·90	—
June	0·59	0·64	0·57	3·81	2·72	5·09
July	0·65	0·58	0·69	3·02	2·14	2·92
August ..	0·70	0·47	0·82	2·71	1·52	2·86
September ..	0·64	0·39	0·80	2·27	1·03	2·57
October ..	0·56	0·19	0·27	0·77	0·31	0·49

North Wales.

Locality.	Date.	Percentage Dry Matter.	Percentage of Ash in Dry Matter.	*Percentage of* Potash in	
				Fresh Bracken.	Dry Bracken.
Aber	1st June	13·7	7·9	·55	4·0
,, ..	1st July	30·5	7·9	·93	3·05
,, ..	27th July ..	27·5	9·5	·84	3·04
,, ..	Withered stems*	—	4·96	—	—
,, ...	,, leaves*	—	2·72	—	—
Maes Mynan ..	3rd August ..	39·0	7·3	·75	1·9
Gors Wen ..	29th July ..	35·2	6·6	·69	1·9
Bodafon ..	1st August ..	37·3	8·2	1·07	2·86
Ty Engan ..	2nd August ..	38·5	6·5	·69	1·79

* Percentage dry matter not determined.

*Long Ashton.**

Locality.	Date.	Percentage Dry Matter Fresh Bracken.	Percentage of Ash in Dry Matter.	Percentage of Potash in	
				Fresh Bracken.	Dry Bracken.
Ashton Hill ..	29th May	18·8	6·9	·67	3·5
Barrow Hill ..	31st May	15·5	7·0	·58	3·8

* Analyses made by C. T. Gimingham.

Rothamsted.

Date when Sample was gathered	Percentage of Dry Matter in Fresh Bracken.	Percentage of Ash in Dry Matter.	Percentage of Potash in	
			Fresh Bracken.	Dry Bracken.
1917				
1st June ..	12·3	7·70	·50	4·1
30th June ..	21·5	5·58	·57	2·6
2nd August ..	27·7	4·87	·54	2·0
1st September ..	33·3	5·34	·61	1·8

laboratory varies from about 8 per cent. in the early stages to nearly 40 per cent. at full growth, and more than 70 per cent. in the dry shrivelled leaves in autumn.

Factors Determining the Amount of Potash Yielded per Acre.—The first point to notice in the tables just given is that the purest ash in no case gives the highest yield of potash per acre; the high grade 54 or 56 per cent. ash yielded by the young shoots, which has appealed very much to some writers in the Press, is so small in amount that it only gives 9 or 10 lb. per acre, a quantity wholly inadequate. Further, directly the bracken begins to die it suffers very considerable losses. Bracken cut during late autumn or winter, the time when it is usually gathered by farmers, contains very little potash. This is the time when labour and wagons can best be spared, but it is not the time to get the best yield of potash. Only during July and August, when the bracken is still green, is any large amount of potash obtainable.

During these months the chief factor determining whether the bracken is worth cutting is its bulk. The difference between Harpenden Common and Ayrshire lies not so much in the difference in potash content, as in the relative luxuriance of growth. In Ayrshire the fronds were 5 to 6 ft. in length—at Harpenden they only came up to a man's knees.

As between different samples of bracken there is a closer similarity than might have been expected in the very early stage of growth, but the relative richness quickly falls off, and more rapidly in some cases than in others. There are not sufficient data to make a general rule, but so far as the evidence goes the falling off appears to be more rapid on sandy or peaty soils than on heavier soils rich in potash; consequently, it is on these heavier soils that the chances of success would be best.

Probable Cost of Collection.—It is difficult to make any estimate of the cost of collection. Cutting would hardly be done at less than 10*s.* per acre, the turning may cost 5*s.*, and the collecting, burning, etc., 7*s.* 6*d.* per acre. The total cost of the ash on the hill or common is thus at least 22*s.* 6*d.* per acre; probably 30*s.* per acre would be nearer the price. We have seen that the potash in the ash may be worth at most 27*s.* 6*d.* to £5 if all the ash is saved and none exposed to rain. Where, as often happens, the land is not easily accessible the cost is increased.

Reckoning the values per ton of ash, the cost of collection might be anything up to £12 or £15 per ton, and the value in perfect condition up to £15 or £20. The ideally perfect conditions, of course, can never be fully realised in practice, and in many cases it would be impossible to keep the ash wholly out of the rain; it might well happen that the value of the ash could only just repay the cost. Where bracken grows luxuriantly and the fronds are 6 or 7 ft. long, however, as in Dundonald Glen, besides being closely packed on the ground, then burning appears to be profitable.

Use as Litter.—There is, however, another and better way of using bracken, and that is to cut it for bedding or litter. This plan has the advantage of furnishing not only potash, but also nitrogen and organic matter to the farm. And, moreover, every load of bracken brought in liberates straw for the Army or for feeding live stock. The plan is not always feasible, because the bracken may be too far away from the farm, but where possible it ought to be adopted.

The Amount of Potash in Other Vegetable Products.—André (*Chimie Agricole*) has shown that the potash content of the ash of certain other leaves and twigs varies in the same way as in the case of bracken, being high in the early part of the year and then falling rapidly. The percentages of potash (K_2O) in the ash were, in the cases examined by him:—

—	Leaves of *Robinia*.	Leaves of Cherry Laurel.	Twigs of Walnut Tree.
April	—	32·8	—
May	30·6	—	—
July	19·2	17·8	35·7
September ..	6·6	12·1	16·9
October	3·2	11·8	—
November ..	—	—	11·4

The rule is probably general; Wolff showed many years ago that potato haulm contains about 40 per cent. of potash in its ash in June, about 30 per cent. in July, but only 20 per cent. in August.

All plants contain potash, some more than others. The amount varies according to the conditions of growth and the stage of maturity, but the general results are as follows:—

	Percentage of Potash in Ash.
Certain seed cases, pods and peelings are richest:—	
Green cases of horse chestnut, potato peelings	70—77
Bean pods	60—70
Certain materials rich in starch or sugar come next:—	
Potato tubers, horse chestnuts, acorns, mangold roots, sunflower (whole plant), rhubarb stalks, pears, plums, grapes	55—65
Certain weeds, which unfortunately are not of dense growth, come next:—	
Achillea millefolium, Borago officinalis, Centaurea cyanthus, Chrysanthemum segetum, Cuscuta europæa, Ranunculus Ficaria, Matricaria Chamomilla, Urtica dioica (stems), Stellaria media	45—55
Beans, peas, straw, turnip root	40—45
A large number of plants taken whole and in full green growth contain	30—40
e.g., Clovers, potato haulm, mangold leaves, bracken, twigs and young wood generally, many weeds.	
Hay	25—35
Fully ripe plants contain less:—	
Wheat grain, barley without seed coats, oats without seed coats	30
Barley with seed coats	20
Oats " "	15
Oat and barley straw	20
Wheat straw	10—15
Older wood	15—25
Seaweeds	15—20
Hop bine (according to degree of withering)	1—25
Lichens, mosses, heaths	5—10
Dead wood and other vegetables left exposed to weather	Down to 1 or 2

However high the potash content of the green growing plant it falls rapidly when the plant withers and is left exposed to the weather. The general rubbish burnt in the field or garden bonfire yields an ash containing only 10-12 per cent. of potash.

General Conclusions.—Wherever bracken can be used as litter or bedding it should be done; not only is this a saving of straw but also an enriching of the farm stock of nitrogen, potash and organic matter.

The best time to cut is July or August, which unfortunately is a busy period for the farmer. Bracken suffers serious losses in potash when it is left out exposed to the weather, and the dead bracken carted in the winter months is nothing like as rich in potash as the green August growth.

Bracken that for any reason cannot be utilised for bedding may well be burnt for its ash, provided always that the operation is so carried out that the ash is not exposed to rain at any time. July and August are the best months. The work could hardly be done by farmers, but would need to be undertaken by some outside organisation.

THE FEEDING OF CONCENTRATED FOOD TO DAIRY COWS ON PASTURE.

IN their joint statement of policy* with regard to the use of concentrated feeding stuffs for livestock, the Board of Agriculture and the Ministry of Food lay down the rule that during the coming months cows in milk while out at grass should receive no concentrated food before the beginning of August. In some districts this restriction will involve no departure from existing practice, but in many other districts, where it has been customary to give concentrated foods to milch cows throughout the pasture season there will be considerable apprehension as to the effect upon milk supplies of withholding such foods.

The question has been submitted to practical tests in several widely-separated areas during recent years, and the following summary of the results obtained may serve to allay any undue apprehension that may be felt. In each case the experiments have been carried out in areas where it is the common practice to give concentrated food to cows on grass.

Armstrong College Experiment, 1905 (*vide* Offerton Bulletin No. 2).—This experiment covered a period of 12 weeks from 19th June to 12th September, 1905. Two lots of 5 cows each were used, one lot receiving no concentrated food throughout the period, whilst the other lot received for the first 6 weeks a daily allowance per cow of 2 lb. maize, 2 lb. Bombay cotton cake and 2½ lb. straw chaff, these quantities then being

* This *Journal*, February, 1918, p. 1177.

increased for the second 6 weeks to 4 lb., 4 lb. and 3 lb. respectively. Prior to the experiment, when all the cows were fed alike, the two lots gave almost equal milk-yields, viz., 167 and 170 pints per day respectively.

For the two periods of the experiment the average daily milk-yields were as follows :—

		No "Cake." Pints.		"Cake." Pints.
Period I. (6 weeks)	..	128·7	..	128·3
„ II. (6 „)	..	109·2	..	112·9
Average for 12 weeks	..	118·9	..	120·6

Clearly no return in milk was obtained for the concentrated food consumed, although there were indications of an increasing effect in the last few weeks. Periodical analyses of the milk similarly afforded no evidence of any effect upon the quality of the milk. Only in the live-weight of the cows was any effect discernable, and that only small, the cake-fed cows showing an average gain over the whole period of 28 lb. as compared with a decrease of 11 lb. in the other lot.

Armstrong College Experiment, 1906 (*vide* Offerton Bulletin No. 2).—The foregoing experiment was repeated on precisely similar lines during the following summer for a period of 10 weeks (18th June—27th August, 1906). The two lots of cows gave identical milk-yields (151 pints per lot per day) during the preliminary period when treated alike. For the experimental period the average results were as follows :—

		No "Cake." Pints.		"Cake." Pints.
Period I. (5 weeks)	..	138·4	..	136·4
„ II. (5 „)	..	108·7	..	112·4
Average for 10 weeks	..	123·6	..	124·4

Thus again, taking the period as a whole the concentrated food produced no appreciable effect, although it was undoubtedly beginning to tell towards the end. No effect could be traced upon the quality of the milk. The average live-weight decreased slightly in each case, the cake lot curiously showing the larger decrease, viz., 74 lb., as compared with 19 lb.

Wye Experiment, 1908.—In this trial, conducted at the South-Eastern Agricultural College, Wye, two lots of 3 cows each

were compared for the period of 10 weeks, from 11th June to 19th August, 1908. For the first fortnight all the cows were treated alike, receiving no concentrated food. During this period one lot gave per week 660 lb. of milk containing 21·6 lb. of fat, whilst the other lot gave 666 lb. of milk containing 20·4 lb. of fat. Subsequently, the second lot received an allowance, starting with 2 lb. and rising to 4 lb. per cow daily, of a mixture of linseed cake and undecorticated cotton cake.

For the 8 weeks during which this differential feeding was continued the no-cake lot gave on the average per week 576 lb. of milk containing 18·9 lb. of fat, whilst the cake-fed lot gave 567 lb. of milk containing 18·8 lb. of fat. The cake-fed lot had thus slightly the worse record in milk-yield but a small advantage in yield of fat. It is obvious, however, that as regards output the cake-feeding must have been entirely unprofitable. In this experiment no records of live-weight were taken.

Leeds University Experiment, Carforth, 1914.—This experiment was carried out with 2 lots of 6 cows each for the period of 19 weeks from 21st April to 28th August, 1914. For a month prior to the experiment the lots received identical rations, and for this period showed weekly average milk-yields of 863 lb. and 905 lb. respectively. During the experimental period the latter lot received no concentrated food, whereas the former received from 2 lb. to 4 lb. of cake per cow daily throughout. The records for successive short periods of the experiment are summarised below :—

	Average Milk Yield per Lot per Week.			*Decrease in Average.*	
	Lot A. (*Cake*).	*Lot B.* (*No Cake*).		*Lot A.*	*Lot B.*
	lb.	lb.		lb.	lb.
Preliminary period (4 weeks)	863	905	..	—	—
Experimental period—					
1st 3 weeks	742	815	..	121	90
2nd „	653	730	..	89	85
3rd „	585	658	..	68	72
4th „	532	588	..	53	70
Last 2 weeks	452	481	..	80	107
Average for 19 weeks ..	603	667	..	260	238

It will be seen that, taking the whole period, the cake-fed cows showed a somewhat greater shrinkage in milk-yield than Lot B. On the other hand the averages for the successive sections of the period showed that after the first 6 weeks the milk-yield of Lot B decreased at a progressively greater rate

than Lot A. This is brought out clearly in the following table, in which the two sets of data have been put upon a strictly comparable basis by taking the average for the preliminary period as 1,000 lb. for each lot, and then adjusting the other averages in proportion :—

	Average Milk Yield.		*Decrease in Average.*	
	Lot A.	*Lot B.*	*Lot A.*	*Lot B.*
	lb.	lb.	lb.	lb.
Preliminary period ..	1,000	1,000	—	—
Experimental period—				
1st 3 weeks	860	900	140	100
2nd ,, ...	757	807	103	93
3rd ,, ...	678	727	79	80
4th ,, ...	616	650	62	77
Last 2 weeks	524	531	92	119
Average for 19 weeks ..	699	737	301	263

The critical point after which the cake-fed cows began to show more and more to advantage would seem to have been about the ninth week of the experiment, or the middle of July.

No influence of the cake-feeding upon the quality of the milk could be detected. Each lot gained in live-weight, the average gain per cow for the period being 82 lb. for Lot A and 24 lb. for Lot B. The expenditure on cake was clearly not compensated for by this slight improvement.

West of Scotland Experiments, 1912-14 (West of Scotland Agricultural College, Bulletin No. 76).—This is the most extensive series of experiments on the subject yet carried out, and comprises 15 separate comparisons made on seven farms during 3 years. On three farms the test was repeated each year, on two farms for 2 years, and on the remaining two farms 1 year's test only was carried out. The total number of cows included in the tests was 224, the numbers used at each centre being mostly sixteen, divided into two lots.

The experiment proper started about the middle of July in each year and lasted three months (12 weeks), although the daily milk records were continued further until most of the cows were dry. At each centre both lots of cows were treated exactly alike, except that one lot received per cow 2 lb. of concentrated food daily (mixed decorticated cotton and soya cakes) in the first month and 4 lb. of the same in the second and third months.

The results are summarised in the following table :—

Average Monthly Yield of Milk per Centre.

(Lot A—no cake. Lot B—cake fed.)

—	1912 (4 Centres).			1913 (5 Centres.)			1914 (6 Centres.)		
	Lot A.	Lot B.	Difference. B–A.	Lot A.	Lot B.	Difference. B–A.	Lot A.	Lot B.	Difference. B–A.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Preliminary Period	32·8*	32·8*	—	35·8*	36·0*	—	34·4*	34·3*	—
Experimental Period—									
1st Month	6,408	6,632	224	5,133	5,561	428	3,812	4,467	655
2nd „	6,809	7,172	363	5,486	6,043	557	4,137	4,800	663
3rd „	5,475	5,755	280	4,652	4,958	306	3,756	4,249	493
Average, 3 months	6,231	6,520	289	5,090	5,520	430	3,902	4,505	603

* Average daily yield per cow.

The detailed returns given in the Report show that the concentrated food consumed on the pastures produced a progressive increase in milk-yield for each month in favour of Lot B at most of the centres. In round figures the increase in favour of each of the cows receiving the extra food amounted on the average to a little under 1 gal. of milk per week in the first month, to a little less than 1¼ gal. per week in the second month, and to nearly 2 gal. per week in the third month of the experiment. The increases varied considerably at the different centres and in the different years.

Taking the whole series of experiments the increase in milk-yield due to cake-feeding amounted to 8·7 per cent., of which 1·9 per cent. (say 2 per cent.) is credited to the first month, 2·8 per cent. (say 3 per cent.) to the second month, and 4·0 per cent. to the third month.

No measurable influence upon the fat-content of the milk could be detected, apart from an apparent slight depression in this respect recorded by the cake-fed lot which was most probably simply attributable to the slower decline in milk-yield with advance of lactation.

The cows were not weighed, but, judged by the eye, the condition of the cows in both lots was much the same at each centre at the end of the experiment.

A profit-and-loss account, based upon the value (at the time) of the increased milk yield as compared with the cost of the cake, is given in the Report and shows on the average of all experiments a loss of 10*s.* 1*d.* per cow for the 12 weeks. Assessed on these lines a small profit was shown in only one of the fifteen tests, although in a second case, the indicated loss was only very small.

If allowance be made for the manurial value of the cake consumed (per Hall & Voelcker's Tables) the above average loss is reduced from 10s. 1*d*. to 2*s*. 6*d*.

After the close of the experiment, when the cows were treated alike, the milk-records for the succeeding month showed a continued advantage in milk-yield for the cows that had been receiving the cake, although the increase for this fourth month was not maintained at the same progressive rate as that of the preceding months. If allowance be made for this extra month in the estimate of profit and loss the apparent loss of 2*s*. 6*d*. is converted into an apparent profit of 3*s*. per cow.

"The weather during the 3 years of the experiment was somewhat exceptional, inasmuch as the total rainfall each year was below the mean, and the deficiency occurred mostly in the late summer and autumn months. It is probable, therefore, that the weather conditions prevailing during the period of the experiment gave rise to effects on the pasture which would be more favourable to the results from the feeding of the cake compared with other years. A distinct scarcity of grass was recorded at several centres where the response was greatest."

General Conclusions from the Various Experiments.—It is rarely in agricultural experimental work that the results obtained in different experiments carried out at such widely-scattered centres are so uniformly concordant as in the experiments dealt with above. They all agree in indicating that, so far as milk production is concerned, the feeding of concentrated food to milch cows on pasture is only required in the later half of the pasturage season, say, from mid-July onwards. In the earlier half of the season, cows receiving concentrated food gave no more milk than others that received none. Even in the later months, when the effect of "cake"-feeding began to show, the results were so modest that there could be no question of much profit, even on the most generous method of assessment. In practically every case the cows paid neither in quantity nor quality of milk nor in improved bodily condition for the concentrated food used. The only other possibility of profit lies in the manuring of the pasture, but any benefit secured in this direction by the cake-feeding must have been dearly bought.

It is not overlooked that the character of the pasture and the nature of the season must considerably affect the requirement for supplementary cake-feeding, but the range of variation of pasture, locality and season in the experiments were

such as to leave little doubt that the conclusions are applicable to any but abnormally bad conditions. They certainly warrant the opinion that during the coming pasture season the average dairy-farmer need have no misgivings in refraining from the use of concentrated feeding stuffs until the pastures get beyond their best, which with a normal season should be towards the end of July in most parts of the country.

BAYNARD'S ESTATE, CRANLEIGH:

AN EXAMPLE OF A WAR COMMITTEE'S EFFORTS TO INCREASE FOOD PRODUCTION.

THIS estate, situate on the Surrey and Sussex borders distant 3 miles from Cranleigh, comprises some 1,362 acres, of which 405 acres were arable, 457 acres pasture, and 500 acres were occupied by woods, buildings, roads, etc.

The estate was purchased by its present owner some 16 years ago; some 250 acres of the arable land had been allowed to go out of cultivation and were covered with briars, seedling birch trees, rough grass and weeds. The extensive farm buildings were unused and the cottages stood empty; except for a few horses there was no stock kept, and the land was overrun with game and rabbits, of which the extensive woods held a large stock. The woods mainly served as game cover, though there was some fair timber, but the single trees in the arable land offered considerable difficulties to cultivation. The soil is of a heavy character, subsoil clay and gravel, and in some places is of a brashy nature, while much of it lies very wet.

The attention of the Surrey War Agricultural Executive Committee was called to the estate during the survey of the county which was made in order to discover what extra amount of land could be brought into or restored to cultivation for the production of food in the present national emergency. The owner was unable to comply with the Committee's wishes to bring the arable land again under the plough, and to convert some of the pasture to arable, and the estate was therefore entered upon and possession taken by the Committee, which succeeded after some negotiations in letting the arable and pasture land, together with the vacant buildings, to three neighbouring farmers, Messrs. Johnston, Sadler and Fortune, on certain terms, these farmers agreeing to cultivate the land in accordance with the scheme framed by the Committee

through their Executive Officer, who submitted an estimate of the probable cost—the scheme and the estimate being accepted by the Food Production Department of the Board of Agriculture. The negotiations were commenced in April, 1917, and the approval of the Board was given in July of that year. It was agreed that the tenants should receive a grant of £4 per acre on the 230 acres of derelict land towards the cost of cultivation and should pay an agreed rent—the result of the transaction being that the amounts of the rent received will balance the payments made for bringing the land into cultivation. The valuation on the northern section of the land, comprising 174 acres taken by Mr. A. B. Johnston, amounted to nothing, as the land was derelict. On the southern section, also taken by Mr. A. B. Johnston, no valuation was allowed on 20 acres 3 roods, which had been ploughed and sown with oats in 1915, and was in such a foul state that it was quite unfit to be put under corn. On another part of the northern section, taken by Mr. J. A. Sadler, no valuation was allowed on 14½ acres, although this had been ploughed and sown with oats, for the same reason as mentioned in the case of Mr. Johnston, whilst on another part of the southern section taken over by Mr. R. Fortune no valuation for a similar reason was allowed on a field of 15 acres. All the hay on the estate had been sold to the Government, some being only fit to be used for litter, and there was consequently no hay for the tenants to take over. On the expiration of their tenancies, therefore, they will be entitled to sell the hay they produce at market price. As Surrey valuations are made on the basis of a Michaelmas entry the outgoing tenant would in the ordinary course be entitled to rent and rates from Michaelmas, 1916, on land from which he had not taken any crops or which he had not fed in any way. The neglected state of the whole of the land taken over precluded any claims of this nature being made on any of the incoming tenants, except in the case of ¾ acre put in with potatoes on Mr. Johnston's holding. The foregoing details are given in order to show the state of the land on entry by Messrs. Johnston, Sadler and Fortune. This can also be realised by reference to Fig. 1. The woods of some 400 acres were taken over by the Committee in order to control the rabbits, and leave was given to the owner to enter the woods for the purpose of cutting and removing timber and underwood, on condition that he undertook to pay full and fair compensation to the tenants of the land for any actual damage caused thereby to the property of the tenants. As some of the

FIG. 1.—Land before clearing, showing twenty years' growth of weeds and bushes.

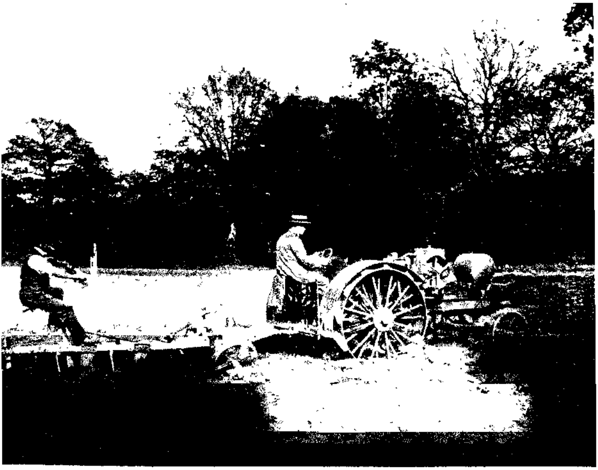

FIG. 2.—Tractor and Plough that have broken up 150 acres in five weeks, later ploughing the second time six acres per day.

timber which is marked to be felled is on the edge of the arable land and there are dotted amongst the fields fair timber trees which should be thrown, great care will have to be exercised in felling and removing, as the damage which may be caused to the crops and to the interests of food production cannot be compensated by any money payment to the tenants. It may be mentioned that the sporting rights on the estate were let to Mrs. Naumann. The acreage taken by the three neighbouring farmers and the rents reserved were as follows :—

		A.	*r.*	*sq. p.*		*Derelict.*		*Rent.*
Mr. Johnston	..	359	3	36	..	190 acres	..	£137
„ Sadler	..	303	0	14	..	70 „	..	£186
„ Fortune	..	200	0	2	..	100 „	..	£150

These three farmers are all busy men. Mr. Johnston farms 600 acres, Mr. Sadler 371 acres, and Mr. Fortune 350 acres, besides Baynard's holdings. It says much for the energy and business capacity of these gentlemen that they should, at a time when less enterprising men are complaining that they cannot carry on satisfactorily their own holdings and cannot possibly plough up any grass or take on any additional responsibilities, undertake such extensive additions to their businesses, especially when the reason given by the owner and late occupier for putting so much of the land to grass and allowing practically the whole of the remainder to become derelict was that it was the more remunerative plan. Of course when corn was at 25*s*. per qr. the case was different, but the present prices are counterbalanced to a considerable extent by the increased costs of production, and there is no doubt that the three farmers' enterprise was seasoned with a very considerable amount of patriotic spirit.

At the first visit paid by the writer to Baynard's before the ploughing was finished the state of the derelict land was appalling. Mr. Johnston had purchased two Overtime tractors which he and his brother, who had been released from the Army for the purpose, worked night and day. Mr. Sadler had bought one, whilst Mr. Fortune has had the services of a steam plough and a Government tractor, and excellent work was being done (See Fig. 2). Unfortunately a wet harvest made difficulties, and a succeeding wet spell in the autumn, during which the plough was idle, prevented the complete scheme of cropping with winter corn being carried out. Mr. Johnston, however, got in 144 acres with wheat out of the 174 acres contemplated, Mr. Sadler 40 acres out of 57 contemplated, and Mr. Fortune 35 acres. Some of this land is so heavy and wet that it must be

ploughed early in narrow lands, and the wheat got in by the middle or end of September, so as to get a plant which will stand the winter—if this opportunity be missed, later sowing is most undesirable, and it is best to leave the land ploughed for winter seasoning so as to get in the spring corn at the first opportunity. This plan was followed on such land as it was not found possible to sow earlier in the season, owing to the wet weather. The second visit was paid in November, and the changed character of the landscape was very striking—on most of the newly-sown land the wheat was brairding well; on a part where some years back a plantation existed the plant was thin; the ravages of rabbits were, unfortunately, too evident (this pest is, however, being dealt with energetically) and there was as yet not much evidence of wireworm attack, but the land required consolidating by rolling at a favourable opportunity. Mr. Johnston had dressed a considerable portion of the derelict land with lime, and it was intended that other portions should be chalked, while the whole had been dressed with basic slag, of which 80 tons had been used. Messrs. Fortune and Sadler had also slagged and limed their land. The corn was to be top-dressed in March with sulphate of ammonia where it appeared to be necessary. The seed wheat used by Mr. Johnston is of the Red Standard variety, and was grown by him on a field of 30 acres which he rescued from a derelict state a year previously. Fig 4 shows the crop of seed wheat growing on the land previously derelict. To preserve the crops from the depredations of rabbits a very considerable amount of wire netting would be required, and as this is at the present time almost unprocurable, and the shooting of the rabbits means a tax on the farmer's time, which with the present labour shortage is a serious matter, some damage must result. It has been found a better plan to wire in the plantations as far as possible, and some 10,000 yd. of wire netting, 5,000 yd. of which were taken over in the valuation and 5,000 yd. purchased by the farmers, have now been erected. Mr. Johnston intends to crop the greater part of his land now under wheat with winter oats in 1919, and by so doing he will have made a very substantial addition to the foodstuffs of the country. Mr. Johnston will have his 360 acres cropped as follows for the 1918 harvest: wheat, 144 acres; spring oats, 30 acres; potatoes 25 acres; peas or oats, 45 acres; the rest being rough pasture which has been well slagged.

Mr. Sadler is cropping his 303 acres in 1918 as follows: wheat, 57 acres; barley, 20 acres; oats, 96½ acres; remainder

rough grass. Mr. Sadler threshed a crop of oats which had been grown on 17 acres (part of the land he now has under wheat), and the yield totalled 20 qr., weighing 28 lb. per bush.!

Mr. Fortune's cropping for 1918 of his 200 acres is 35 acres wheat, 25 acres oats or barley, 10 acres swedes; the remaining 130 acres of grass, being well watered, are being brought into good heart by slag and ground lime in order to carry part of his Dairy Shorthorn herd, and so release more of Mr. Fortune's own farm for arable cultivation.

447 acres of corn are thus being added to the food supply, and this with a fair harvest should add some 2,400 qr. of corn to the nation's food supply; in addition the grass land will carry at least twice the head of stock it carried previously, and when it is considered that probably not 100 qr. would have been produced under the old management it must be allowed that the activity of the War Committee and the enterprise and patriotism of these three farmers promise a useful result.

PIG FEEDING IN WAR TIME.

PART III.*

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IT was decided to fatten the hog pigs from Lots A and B, of which an account was given in the November issue of this *Journal*, which described the feeding and rearing of the pigs down to 3rd October, 1917.

The rations being fed to them at that date were as follows:—

Lot A.		*Lot B.*	
$\frac{1}{4}$ lb. sharps,	As slop.	$\frac{1}{8}$ lb. sharps.	As slop.
$\frac{1}{4}$,, tail barley meal		$\frac{1}{8}$,, tail barley meal	
2 ,, marrow-stemmed kale.		2 ,, marrow-stemmed kale.	
$\frac{1}{2}$,, palm kernel cake.		$\frac{3}{4}$,, palm kernel cake.	

Further, the pigs were out on grass day and night.

On 10th October the pigs were weighed, and the hogs, fifteen in number, were separated out and run in an open yard. Their ration was then—

3 lb. marrow-stemmed kale (cut)	mixed.
1 ,, palm kernel cake.	
$\frac{1}{2}$,, sharps	As slop.
$\frac{1}{2}$,, tail barley meal	
6 ,, marrow-stemmed kale (uncut).	

* For Parts I. and II. see this *Journal* for October and November, 1917.

After a few days it was found that the marrow-stemmed kale was not eaten very readily. This was evidently due to it having become tough and stringy, as earlier in the year, when the stems were soft and succulent, the pigs had eaten it with avidity. Cabbage was therefore used to replace it.

About the middle of October the weather became very wet and the yard in which the hogs were running became very dirty; they were therefore put into the fattening pens, and divided up as follows:—

Pen. I.	*Pen II.*	*Pen III.*
Sow 2, Pig 4, 93 lb.	Sow 2, Pig 3, 90 lb.	Sow 2, Pig 1, 78 lb.
,, 2 ,, 7, 73 ,,	,, 3 ,, 4, 93 ,,	,, 3 ,, 2, 96 ,,
,, 3 ,, 3, 94 ,,	,, 3 ,, 5, 83 ,,	,, 4 ,, 3, 91 ,,
,, 4 ,, 8, 88 ,,	,, 4 ,, 1, 88 ,,	,, 4 ,, 6, 78 ,,
,, 1 ,, 4, 89 ,,	,, R.M. 76 ,,	,, 1 ,, 3,108 ,,
Total .. 437 lb.	Total .. 430 lb.	Total .. 451 lb.
Average 87·4 ,,	Average 86·0 ,,	Average 90·2 ,,

All the pigs from sows 1, 2 and R.M. were Lot A pigs, and all those from sows 3 and 4 were Lot B pigs. Great care was taken to make the three pens as even as possible. As the hogs were not weighed on the day they were put in the pens, the weights given are those taken on 10th October.

Sawdust and wood chips were employed as litter during all the time the hogs were fed, and on them the pigs were kept clean and comfortable.

Owing to difficulties in obtaining supplies, it was found necessary on 19th October to substitute coconut cake for the palm kernel cake; this change was made gradually, and as soon as supplies of the palm kernel cake were available, it was again used.

There were on the farm a supply of "chat" and diseased ware potatoes, unfit for human consumption, and as it was intended to use these throughout the fattening period, a start was made on 1st November by giving the hogs 1½ lb. per head, mixed with their cut cabbage and cake. After two days an additional 1½ lb. were fed to them mixed in the evening slop. No difficulty was experienced in getting the hogs to eat the potatoes.

On 6th November, after an interval of 28 days, the hogs were again weighed, showing a gain for Pen I. of 24·8 lb., for Pen II. of 25·6 lb., and for Pen III. of 25 lb. (See Table I., cols. 1 and 2.)

From this date (6th November) slop was discontinued altogether and was replaced by:

4 lb. potatoes,
½ ,, sharps,
½ ,, barley (tail) meal,
in addition to 9 lb. cabbage and 1 lb. coconut cake.

The potatoes, which were fed *raw*, were mixed with the dry sharps and barley meal. Cutting the potatoes in the turnip cutter was found to be impossible, owing to the danger of stones getting in and breaking the knives, so they were roughly chopped. After 14 days, that is on 20th November, the pigs were again weighed.

when Pens I. and II. showed practically the same increase as at the previous weighing, but Pen III. had not done so well. (See Table I., cols. 3 and 4.) So far the hogs had only been on a ration which was a little better than store, but from 20th November their fattening rations were fixed as follows :—

Pens I. and II.	*Pen III.*
1½ lb. coconut cake.	1 lb. coconut cake.
½ ,, sharps.	½ ,, sharps.
½ ,, barley (tail) meal.	½ ,, barley (tail) meal.
12 ,, potatoes.	12 ,, potatoes.
4 ,, cabbage.	4 ,, cabbage.
	and ½ ,, castor oil meal.*

The concentrated food and the potatoes were mixed together and fed morning and evening. The cabbage was given uncut at mid-day.

For the first few days the hogs did not quite clear up all their ration, so for a week only two-thirds of the amounts mentioned were fed, after which the full ration was returned to and no difficulty was experienced in getting the hogs to clear up. The supply of tail meal ran out on 23rd November and was replaced by an equal weight of sharps. On 4th December, after an interval of 14 days, the hogs were again weighed, but the results, with the exception of Pen III., were not quite so satisfactory as they had been at the end of the preceding fortnight. (See Table I., cols. 5 and 6.)

The concentrated ration was altered on 4th December—

Pen I. getting 1 lb. home-grown linseed cake,† 1 lb. coconut cake, and 1 lb. sharps ;

Pen II. getting 1 lb. imported linseed cake,† 1 lb. coconut cake, and 1 lb. sharps ; and

Pen III. getting the same as Pens I. and II., except that ½ lb. castor oil meal was used instead of the linseed cake.

On 10th December, kohl rabi were used to replace cabbage, and after a few days it was found that the hogs would eat more of the roots than they would of the cabbage. By 16th December they were clearing up 6 lb. per day. It was fed roughly chopped, each root being cut into about four pieces. This method seemed more satisfactory than cutting in the machine. It may be that the machine imparts a taste of steel to the roots ; but it was always found that the hogs ate the roots in larger quantities and with more relish when they were fed to them roughly chopped.

A fresh supply of palm kernel cake having been obtained, this was now used to replace the coconut cake—weight for weight.

On 18th December the hogs were again weighed, and a study of Table I., cols. 7 and 8, shows that they had been doing well during the 14 days.

In the case of Pens I. and II. 18·8 lb. live-weight increase had been produced at a cost of 42 lb. concentrated food, and in the case of Pen III 15·6 lb. had been produced at a cost of 38·5 lb. of concentrated food. These figures are very satisfactory.

* The castor oil meal was used by request to test if a new process had removed its poisonous properties ; so far we find the meal useful.

† The linseed cake was fed for experimental purposes ; it may be replaced by equal parts of palm kernel and coconut cakes, weight for weight.

On 19th December the potato ration of all three pens was raised by 2 lb. to 14 lb. per head per day, and at the same time the castor oil meal given to Pen III. was advanced to 1 lb.

Unfortunately, just at this time, very severe frost stopped the work of sorting the potatoes in the pit, and from 21st December to 2nd January kohl rabi at the rate of 14 lb. per day were used to replace the potatoes.

On 1st January the linseed cake ration of Pens I. and II. was raised to 1½ lb. per day, and the castor oil meal to Pen III. to 1½ lb.

After an interval of 28 days, *i.e.*, on 15th January, the hogs were again weighed, showing satisfactory results. (See Table I., cols. 9 and 10.)

On this date also a rearrangement of rations had to be made. Owing to delays on the railway a fresh supply of castor oil meal had not arrived, and Pen III. was put on to 2 lb. palm kernel cake and 2½ lb. sharps. Pens I. and II. were given an additional ½ lb. sharps. At the same time mangolds were used to replace the kohl rabi, and it was found that the pigs would clear up 7 lb. On 18th January it was noticed that one or two of the hogs were scouring slightly, but a mild dose of salts given in some slop soon put them to rights.

Arrangements being made for the hogs to go to a bacon factory on 4th February, the well-known authority Mr. H. Bell, of Messrs. A. T. Grain & Sons, of Cambridge, examined them on 30th January, and selected 12 as being fit for bacon, but the manager of the factory on being written to asked that all 15 might be sent. Unfortunately, one of the hogs in Pen III. hurt his shoulder and went entirely off his feed for several days.

On 31st January the final weighing was made (see Table I., cols. 11 and 12). The hog in Pen III. that had met with the accident had actually lost weight, so this naturally brought down the average for the pen. At the same time neither of the other two pens had done so well as previously, suggesting that if the pigs had been kept on any longer it would have been necessary to raise the concentrated ration.

On their way to the bacon factory the hogs were exhibited in Cambridge Market, and created a good deal of interest.

On their arrival at the factory they were carefully examined by the manager, and one hog was marked by him as being more suitable for the fresh pork than the bacon trade. The carcass weights were obtained (see Table I., col. 13) and the percentages are given (see col. 14).*

The 15 pigs produced 2,002 lb. pork. After the carcasses had been dressed the manager of the factory reported upon

* Tables II. and III. give the food consumed by the hogs (in Lot A and Lot B) from the time they were weaned to the time they were put up to fatten; Table IV. gives the average daily rations of the three pens during the fattening period from 20th November to 31st January; and Table V. gives the total foods consumed from weaning time to end of the fattening period, and the resulting gain in live weight.

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TABLE I.—*Average Weights of Pens (weight in lb.).*

Number of Pen.	Weight, Nov. 6.	Gain in 28 days.	Weight, Nov. 20.	Gain in 14 days.	Weight, Dec. 4.	Gain in 14 days.	Weight, Dec. 18.
	1	2	3	4	5	6	7
Pen I. ..	112·2	24·8	125	12·8	134	9	152·8
,, II. ..	111·6	25·6	124	12·4	134	10	152·8
,, III. ..	115·2	25·0	124	8·8	134·4	10·4	150·0
Average ..	113	25·1	124·3	11·3	134·1	9·8	151·8

Number of Pen.	Gain in 14 days.	Weight, Jan. 15.	Gain in 28 days.	Weight, Jan. 31.	Gain in 16 days.	Carcass Weight.	Percentage.
	8	9	10	11	12	13	14
Pen. I. ..	18·8	185·2	32·4	195·2	10	136·6	69·98
,, II. ..	18·8	185·0	32·2	197·2	12	137	69·46
,, III. ..	15·6	171·4	25·4	185·0	9·6	126·2	68·1
Average ..	17·7	180·5	30·0	192·5	10·5	133·3	69·18

TABLE II.—*Store Period after Weaning: Foods Consumed,* LOT A.

*Grazing	16 weeks.	Average age—	
† ,, and on stubble	7 ,,	At weaning	58 days.
Mangolds	25 lb.	When put up to feed	249 ,,
White turnips ..	71 ,,		
Kale (marrow-stem)..	114 ,,	Average weight of pigs—	
Cabbage	297 ,,	20th November when	
‡Palm kernel cake ..	84 ,,	put up to fatten ..	130 lb.
‡Coconut cake ..	30 ,,	At weaning	29 ,,
Sharps (as slop) ..	51 ,,		
Tail corn meal (slop)	36 ,,	Average gain in 191 days	101 lb.

TABLE III.—*Store Period after Weaning: Foods Consumed,* LOT B.

*Grazing	13 weeks.	Average age—	
† ,, on stubble..	7 ,,	At weaning	59 days.
Mangolds	32 lb.	When put up to fatten	226 ,,
White turnips ..	70 ,,		
Kale (marrow-stem)..	62 ,,	Average weight of pigs—	
Cabbage	297 ,,	20th November when	
‡Palm kernel cake ..	75 ,,	put up to fatten ..	119 lb.
‡Coconut cake ..	42 ,,	At weaning	30 ,,
Sharps (as slop) ..	56 ,,		
Tail corn meal (slop)	28 ,,	Average gain in 167 days	89 lb.

* Grass land suffered much from drought.
† Stubble cropped with good red clover plant.
‡ Cakes always fed dry.

TABLE IV.—*Fattening Period: Average Daily Rations.*

	Pen I.	*Pen II.*	*Pen III.*
Linseed cake, home-grown	1 lb.	Imported 1 lb.	Nil.
Palm kernel cake	·7 ,,	·7 ,,	1·2 lb.
Coconut cake	·4 ,,	·4 ,,	·3 ,,
Castor oil meal	Nil	Nil	·62 ,,
Sharps	1 lb.	1 lb.	1·20 ,,
Cabbage	·7 ,,	·7 ,,	·7 ,,
Kohl rabi	4·4 ,,	4·4 ,,	4·4 ,,
Mangolds	1·5 ,,	1·5 ,,	1·5 ,,
Potatoes	10·8 ,,	10·8 ,,	10·8 ,,
Average Weight of Hog—			
20th November	125 lb.	124 lb.	124 lb.
31st January	195·2 ,,	197·2 ,,	185 ,,
Average gain in 72 days	70·2 ,,	73·2 ,,	61 ,,
Average daily gain	·975 ,,	1·016 ,,	·847 ,,

TABLE V.

Foods Consumed:—		
Grazing	26 weeks.	15 bacon hogs, average age 307 days.
Cake	314 lb.	
Sharps	141 ,,	Average weight of each hog—
Meal	33 ,,	At weaning .. 30·0 lb.
Kohl rabi, mangolds, etc.	954 ,,	31st January 192·5 ,,
Potatoes	767 ,,	

Result:— 26 weeks grazing, 488 lb. concentrates, 1,721 ,, farm produce } yielded 162·5 lb. increase.

them as follows: "Lean meat healthy, good colour and plenty of it. Colour of lean meat nice and delicate, like chicken. Well marbled. Not coarse. Colour of fat good."

In order to arrive at the amount of concentrated food required to produce 1 lb. of *pork*, the food fed to the sows must be taken into consideration.

The sows' spring litters yielded	180 lb.	weaned pigs.
,, autumn ,, ,,	192 ,,	,,
A total of	372 ,,	,,

During twelve months all the food fed to the sows had been weighed, and it was found that they had on an average consumed 1,285 lb. of concentrated foods, *i.e.*, 1 lb. of pigling cost 3·45 lb. of concentrated food. The piglings averaged at weaning 30 lb., so that up to that time they had cost 103·5 lb. of concentrated foods. Table V. shows that 162·5 lb. of bacon hog cost 488 lb. of concentrates, so that up to the day of slaughter the hogs had consumed 591·5 lb. of concentrated food. As they averaged 133·3 lb. *pork* (Table I.), *1 lb. of pork was the equivalent of* 4·4 *lb. of concentrated food.*

It is important to note that not a pound of this food was fit for human consumption.

RATS: HOW TO EXTERMINATE THEM.

PART II.

R. SHARPE.

(Concluded from last Month.)

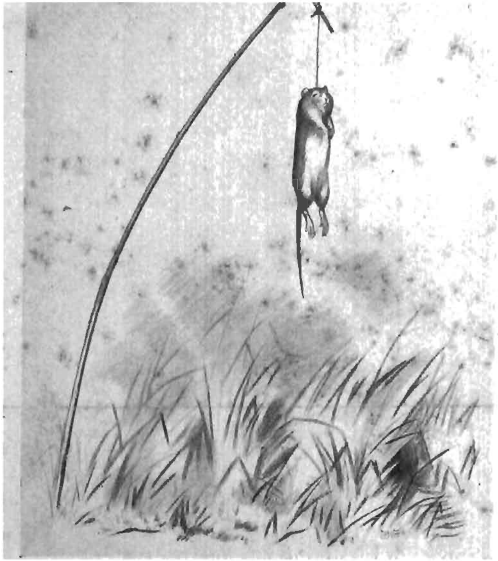
Uses of the Snare.—The snare is a very suitable means of taking rats after the attack with poison has been carried through, that is, presuming that the original conditions required such drastic treatment. The snare is harmless to game and poultry and does not call for the regular attention which is so essential in the case of traps. Snares need not be visited early and late, the reason being given in picture form in Fig. 1. Fig. 2 explains how the plans are laid for producing so satisfactory a result. The jerk of the bent stick draws the noose tight round the rat's neck, so that when caught it is quickly strangled. When rats are taken in a trap there is always the risk that they will twist off their feet, but no equivalent opportunity for escape occurs in snaring. Snares must, of course, be visited every day for the purpose of re-setting those which have made catches, at the same time making sure that the others have not been disturbed in the interval. A very important duty when dealing with snares, and for that matter with all other catching apparatus, is to dispose promptly of the rats. These should be buried deep down, as nothing more quickly tends to make the survivors "wary" than the leaving of their deceased companions in the vicinity of the operations. Such a hint would hardly seem to be necessary, but experience suggests that the precaution recommended is often neglected. Slinging them by the tail into neighbouring clumps of brushwood is nearly as bad as leaving them near the trap, or snares, for nothing is more offensive and objectionable than decaying rats. Snaring is not to be recommended when large quantities of rats are about, the survivors becoming "snare shy" before the work is half through.

A Necessary Precaution for Novices.—The bender is a springy stick pointed at one end and firmly planted in the ground so that it shall jerk into the upright position when a rat is caught. When setting a snare care should be taken to keep clear of the bender, for if it should happen to be released unexpectedly it may hit the snarer in the face with possibly serious results. So grave, in fact, is the risk that I should always advise the novice to take a very simple precaut on which makes such mishaps impossible. The device I recommend consists mainly of a peg some 9 in. long, carrying a short crook at the

top formed from a side branch. The hazel grows many natural crooks of this sort. To the crook must be firmly attached a length of stout string, about 18 in. long, having a loop at the free end. The peg is driven into the ground immediately below where the bender will eventually be held down. The string is carried over the bender, the loop being threaded over the crook on the peg. The bender is thus prevented from rising higher than 9 in. off the ground. With this device in use the snare can be set with safety, and it should not be dispensed with until such time as the habit of avoiding the radius of the bender has become second nature. The novice should do all his adjusting and testing of the snare with the safety apparatus in place; but he must never forget to remove it when all is complete, otherwise any rat which enters the snare with blocked mainspring, so to speak, escapes for the time being.

Description of the Snare.—Apart from the bender, of which only the extremity is shown in the illustration, the other wood parts are the "teeler" and the "ground peg." The teeler is a piece of stick about the thickness of a lead pencil. It should be made 4 in. long, and one end of it must be split so as to provide a holding for the wire noose. The split end is known as the grip, the illustration clearly showing the manner of pointing the end. The opposite end to the grip is cut flat above and below, the shape given being such as to ensure a firm seating in the notch cut in the ground peg, and a proper bearing for the overhanging hook. The ground peg may be made about 10 in. long, though if the soil is light or soft a much longer peg is necessary. In hard ground a rather shorter peg suffices. The peg must be forced into the ground so that the notch is about 1 in. clear of the surface, the teeler being thus given a position which will enable the noose to be arranged over the run at a height of about ¾ in. The formation of the ground peg is sufficiently explained by the illustration, and its function, together with that of the various other parts, will also be apparent. Practical work in setting, and testing when set, will supply all necessary guidance as to the best shape for the notch, the amount of overhang of the projecting arm, and other details. The combination works as a delicate catch for holding down the bender. A rat running into the noose releases the catch, with the result that the noose is drawn tight with a jerk, the rat being swung clear off the ground in the process.

The function of the various parts having now been referred to in a general way the detailed description may continue. Having cut the teeler the next process is to take a piece of



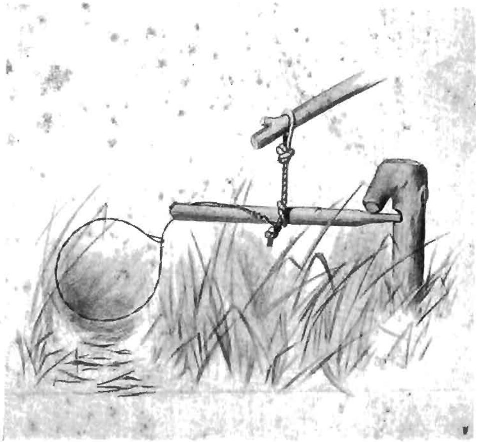


FIG. 2.—RAT SNARE.

Artistic licence has been exercised in leaving visible the details which the careful trapper always arranges to conceal from view.

parcel string 12 in. long and to form at one end of it a loop 1 in. long. This loop forms the attachment with the bender. Next the string must be tied round the middle of the teeler, the knot being so arranged that there shall be a straight pull against the hook of the ground peg when the tension of the bender comes into play. If the knot is set to one side or the other the pull of the bender causes the teeler to sit uneasily in the notch. When the string has been correctly attached to the teeler a free length of 3½ in. is available for fastening to the wire noose. The knot having been tied, about 1½ in. of string separates it from the teeler. Some 13 in. of ordinary snaring wire is required to form the wire noose. A single thickness suffices, the eye being formed by twisting one end. As an alternative, double this length of extra thin wire may be used, the ends being brought together and the two twisted lightly around one another, all as shown in the illustration. There is no objection to the wire being double, provided it is very thin, though on the whole I prefer a single thickness. If there has been no waste of wire in making the knot sufficient remains for a loop of about 2½ in. diameter, with in addition a short length of wire leading to the knot. This portion of the wire must be fixed in the cleft of the teeler and be so inserted with reference to the loop that the eye comes on top. Fig. 2 will explain what is meant, for obviously the noose would be liable to sag if the wire passing from the teeler took the high road instead of the low road. The bender is of about the stoutness of an ordinary walking-stick. Its length is 5 ft., and it may be of ash or hazel, the latter for preference. If the butt end has about 3 in. circumference the natural taper will give it the right sort of springiness. As a general guide, one may say that when bent over it should pull against the ground peg with a tension of three or four pounds. This gives plenty of strength for lifting a full-size rat clear of the ground. A stiffer bender is to be avoided because it makes what I might call a hard trigger pull; in other words, the rat's task in pulling at the snare must not be made too difficult.

On Setting a Rat Snare.—In choosing a spot for setting a rat snare one should first of all make sure of enough grass to conceal the machinery. This is the only detail where the illustration misses reality, artistic licence having been taken to enable the reader clearly to see the details. The less that can be seen of the peg and the teeler from the point of view of the rat the better. *The wire then represents no more than a piece of* tangled herbage, like fifty others through which the rat is in the

habit of forcing its way. The bender cannot be hidden, but it is hardly of a nature to cause suspicion.

As already stated the dimensions given for the various parts of the snare permit of the loop having a diameter of 2½ in. with its lower sweep about ¾ in. above the run. The ground peg should be placed about 4½ in. from the side of the run; and as the teeler is 4 in. long its grip end just fails to overhang any part of the run. As rat runs are always narrow and well-defined the 2½ in. loop will just cover the whole width of the run and no more. Having fixed the peg so as to comply with the above requirements the bender must be planted in the ground some 4 ft. back. This should bring it into the proper position when bent over ready for attaching to the string. Care and practice will enable the novice so to plant the bender that it gives a true vertical lift to the string. Having fixed the bender the safety peg described in the separate note must be put into place. The end of the bender should always be notched or otherwise treated so that the weight of the rat shall not cause the loop to slip. The teeler is now ready to be inserted into the notch of the ground peg. In making the final adjustment care must be taken that the setting shall be sufficiently light to ensure immediate action of the snare the moment a rat puts its head in the loop.

To Deal with Snare-Shy Rats.—When results suggest that rats have become shy of going near snares a stratagem similar to the one recommended for traps should be adopted. In cases of this kind—and, in fact, at other times as well—I set the snare in all respects complete except for the correct placing of the noose. On such occasions four or five of the main runs are selected, places in them being chosen where there is a good covering of grass to hide the ground peg. The whole snare is then set up in the proper position, with in addition the safety peg and string to prevent accidental release. The wire loop, instead of being laid across the run, is bent close up to the teeler so as to leave the run quite clear. The rats are then able to use the run freely, and they soon forget the slight disarrangement of the surroundings which has taken place. The "foil" also has an opportunity to clear off. After the snare has been a couple of nights in this condition, with a piece of stick I push the wire back across the run, at the same time removing the safety peg. The results as a rule generously repay the extra amount of time and trouble taken.

The Terrier for Rat Catching.—To leave out the terrier would be to commit an injustice on a most capable assistant in a good

cause. My acquaintance with working terriers is not less thorough than with the metal and wood implements for catching rats. Poison must stand supreme as the only means of ridding neglected land quickly and with a small expenditure of effort of the majority of its rat population. Trap and snare can alone follow afterwards for reasons which will be apparent when explained. The ardent lover of dogs would hardly care to turn them loose on land which had just been poisoned, for certainly not less than 60 per cent. of the poisoned rats would be lying dead in their holes and other places of refuge. Of the remaining 40 per cent. that die in the open many would not be gathered. To turn ferrets into such holes to give the dogs their chance would mean that the ferrets would simply gorge on the dead carcasses, and this with fatal results in the case of many kinds of poison. Some terriers would be inclined to mark holes containing dead rats, but an old and knowing dog might be relied upon to pass them by. All told, I cannot quite see where the terrier comes in during the actual poisoning campaign and the period immediately following. Where for various reasons poison is inadmissible the terrier is invaluable. The terrier may be given credit for the ability to hunt out the last rat, but also for the even more important duty of dealing with the first fresh arrival to appear on premises which have been cleared. Should this happen to be a doe the service performed is invaluable.

A really keen ratter will often be the first to proclaim the presence of a rat on premises where such is not believed to exist. There may be no mistaking his excited bark when he has located his game, perhaps under the corn-bin or the water-butt, or often in a heap of faggots, such places forming a favourite shelter to these rodents. The barks and yaps may become louder and louder until he has succeeded in attracting someone's attention, past experience telling him that assistance is necessary on such occasions, in the form of poking with a stick until the rat decides to bolt, a kill following in due course. Rats, when disturbed at dusk in the course of their search for food, nearly always make for these handy shelters, and they remain in them until quiet is once more restored.

Rat Hunts after Dark.—It will prove useful to hunt for rats after dark, always provided that the terriers are good at the work and quick killers. One or two hurricane lamps are most useful on such occasions. A lamp of this sort placed on the ground so that it may throw a steady light will suffice to command some chosen spot which rats are judged likely to

cross. One man in a position commanding the lighted area holds the dog quite loosely whilst a second man, if possible with another terrier, works towards the prepared spot. The moment a rat crosses and is perceived by the dog it breaks loose and takes it. Some really fine hauls may be obtained in this way, and the many in which I have taken part prove that they encompass the destruction of many rats. The short feeding holes to which rats are in the habit of retiring to devour unmolested any tit-bits they may have found are nearly always to be found in fowl pens, or on the plots where fowls are fed when feeding is done outside. If a visit is paid to such enclosures after dark, the disturbed rats will take refuge in the small holes in the same manner as if they were faggot heaps, that is provided they are not already inside indulging in a meal. A good dog will, of course, scent them out. I have often known as many as seven or eight obtained in a single night this way, holes in enclosures of one sort and another being as a rule the best places to search, no doubt because access to them is not possible to dogs and cats. Rats should not be dug out of such holes, should they refuse to budge under the persuasive influence of a stick. A bucket of water poured down the hole brings them to the surface at once, so leaving intact a most useful rat-made death trap. Against digging at any time is the fact that this kind of disturbance of the haunts of rats breeds suspicion and makes them much more difficult to catch afterwards.

Rats Feeding on Stubbles.—There are many, no doubt, who have noticed the same kind of feeding hole which is mentioned above situated in stubble-fields, more especially before the corn has been carried. A favourite place for these holes is at the base of the stooks. Here of all places is the champion hunting ground for the ratting terrier. A moonlight night should be selected for such excursions, and the field of battle should be approached from a direction which cuts off the line of retreat to the holes of the rats. The necessity for this line of approach will be obvious; for to start operations from any other direction would send the rats scampering away to their stronghold. When it happens that burrows are fairly evenly distributed on all sides of the field the only possible plan is to start from one side on one night, from another the next night, and so on until each set of inhabitants has been dealt with in turn. Rats will not, as might be supposed, betake themselves to strange shelters when a raid is on. Rather, they crouch under stooks or go to earth in available

feeding holes. Excursions of this nature should not be postponed till after the corn has been carried, for the stooks form so favourite a retreat, and are so vulnerable to attack, that the opportunity they provide should not be missed. In fact, the earlier the date of the visit after the corn has been cut the better, because as soon as the rats have accumulated food hoards in their burrows the less likely are they to betake themselves to the open fields. Though much corn lies about after carrying, in the form of gleanings, the fact remains that the loss, maybe, of convenient shelter, drives them elsewhere. Whatever the explanation, they are much diminished in number when the field has been cleared. A couple of good terriers are essential if excursions of this nature are to produce results in proportion to the opportunities provided.

Using Ferrets with Dogs.—Terriers are invaluable when rats are being turned out of their holes by the aid of ferrets. There are doubtless many owners of good working terriers who are unversed in the methods of teaching a dog not to touch a ferret. A tip or two on this subject will, therefore, not be out of place. If the ferrets are under the same ownership as the dog, the dog should always accompany his master when he goes to feed the ferrets. At such times the ferret should be taken out of the hutch, the dog being always given an opportunity to smell it. To avoid accidents the ferret must be so held that it cannot bite the dog; the dog in its turn being warned, " 'ware ferret," or chided with a severe " no " should it make the least attempt to snap at the ferret. If this routine is carried out for a few days, the dog soon learns to look upon the ferret as a friend. The next stage of education is to place the ferret on the ground, allowing the dog to watch it run about. When real work begins a dog so taught will have already begun to realise what is expected, but even then the final precaution should be taken of holding the dog when it sees the ferret at work for the first time, and it should only be released when the first rat bolts. Provided the early stages of education are passed without any accident such as would breed enmity between dog and ferret, the two very soon learn to work amicably together.

Precautions to be Observed with Ferrets when Used in Buildings.—Care should always be taken to avoid putting ferrets in holes which may be suspected of leading to the roof. The climb is generally quite easy, but the return journey may offer difficulties which the ferret fears to face. A ferret so lost may remain in the roof for days, hunger ultimately forcing

it to seek some easier route of escape. If perchance the one chosen leads to the fowl-house or duck-pen, or even to a coop of chicks, the results will be disastrous. What so often happens to cause ferrets to get lost in buildings is that they are placed on the wall-plate where a rat has been seen to run, and they follow the scent regardless of difficulties, the rat being the better climber usually escaping. The problem of return then breeds fear in an otherwise courageous animal.

Introducing a Terrier to its First Rat.—Care must always be taken to give a dog a fair chance when first brought face to face with a rat. Sometimes people are so foolish as to expect a dog to kill its first rat when the latter is held in a gin, the two being so placed that the dog may see the rat. To encourage a dog to attack under such circumstances is sheer madness. In cases of this kind it very often happens that a dog gets bitten, but if game it will fight on in the hope of gaining a more effective grip of the rat. In so doing it will almost surely bite the trap at the same time, the pain so inflicted causing the dog to let go, when it may again be bitten. Not only is the dog badly punished in the process, but it may break one or more teeth against the trap, so destroying some of its usefulness afterwards. A dog which persists in attacking under such unfavourable circumstances is surely too good to spoil. Rat-bites so inflicted are especially dangerous, not only because of the desperation of the rat, but because in its previous endeavours to escape it is sure to have soiled its teeth with untold filth scraped from the rusty trap. One puppy which I well remember died a few days after such an encounter. When a dog or a ferret gets bitten by a rat the wound should be promptly cleaned and disinfected with Condy's fluid. As time counts for everything, a syringe should (if possible) be carried on the person, together with a small bottle of the chemical, the object of the syringe being to dr ve the fluid the whole depth of the puncture made by the rat's teeth. The plan I always adopt for introducing a young dog to rats is to procure a live one and take it out into the middle of a field. Then I liberate the rat, releasing the dog when the rat starts making off. If the dog is one of the right breed it will make short work of the quarry. Though it may get bitten in its novice encounter even when the conditions are properly arranged, the danger of after-effects is by no means serious. In fact, I am not sure that a "pinch" at the beginning is not an important part of the training, as it teaches the dog from the very commencement the importance

getting in the first bite. Condy's fluid will allay all risks spoiling a good dog thus early in its career.

Terriers in Relation to Poison.—Perhaps a few final remarks will ıke quite clear the separate duties of poison and terriers. ·erybody must realise that there are believed to be about many rats as human beings in this country. They exist erywhere, around the docks, wharves, and other places ıere food is handled and stored in the outskirts of towns, ıd in the country proper. The agricultural rat, with which am mainly concerned, is to be found both around the farm ıildings and rick-yards, and in the hedgerows and open aces. It moves from one situation to another according the season and circumstances. There is undoubtedly a ry strong prejudice against the use of poison. This dislike the only effectual medium for use in the open country may explained in a variety of ways. First of all the only ganised attacks on the rat population have taken place in e sea-port areas, where the rat is mainly considered as a reader of disease. To poison rats in granaries, and some ght add farm buildings, is not the same thing as to poison em in hedgerows and ditches. Authority is thus against ison in general, though the dislike is based on experience one kind of place only. I do not know what method used in places where poison is barred; but the surv vors of ıatever process is applied are remarkably numerous and urishing. Now poisoning is a "keeper's" method, and as ch it is seldom mentioned except in whispers, but when it s been properly applied there are no rats, flourishing or herwise. Surely the moral is obvious. Now, I have already ınted out the objections to setting terriers to work, with without ferrets, immediately after a poisoning campaign, ıd that is why I did not mention them when outlining my an of poisoning followed by trapping and snaring. But. suming there are places where it has not been deemed lvisable to lay poison, and there must be many, or others ıere outly ng colonies of rats have been overlooked, then e terrier comes into its own. As has been made quite clear ove, poison cannot be used repeatedly on the same ground, erefore in the long intervals between poisoning campaigns e terrier will have ample opportunity to prove its worth.

Wounded Soldiers Might be Taught Rat-trapping.—Many forms employment have been suggested for wounded soldiers, but can imagine none that would better suit them than rat- ···ing. The open-air life, the hourly interest of their pursuit,

the necessity to pit brains against cunning, these are all on the r ght side, whilst the work itself is not of an exhausting nature. Wounded sold ers could be readily taught the art of taking rats by means of the snare, the water-pit trap, and the ordinary gin. With the continous attention they would be able to devote to the task I am confident that any intelligent one of their number could in a short timc rid any farm of the last rat which had survived a poisoning bout—not only rid the place, but keep it constantly clear by having a certain number of pit-traps constantly set. Fresh-comers would more readily fall victims than local inhabitants. With the aid of a "bike" one man could attend to a whole parish, and no finer combination of pleasure and business could be imagined.

MOLE-PLOUGHS WORKED BY HORSES.

THE necessity of greatly increasing the area of arable land has resulted in a considerable extension of the practice of mole-draining. Fields having a uniform heavy clay subsoil can by this means be effectively drained at a total cost of 20s. to 30s. per acre, and the drains are often quite efficient at the end of 15 or 20 years. As a rule mole-draining is done by steam-tackle, and where this can be employed it is undoubtedly advisable to do so. There are, however, cases where the necessary equipment is unobtainable or where the fields are too small to make its use an economic proposition and, in such cases, a simple form of mole-plough operated by horses might often be used with satisfactory results. The attention of the Board has recently been called to two such ploughs which have been successfully used for many years in Buckinghamshire and Essex respectively.

The two ploughs are in all essential respects very similar. Each consists of a strong wooden beam fitted with stilts like those of an ordinary plough. In the centre of the beam is inserted a stout iron blade or coulter sharpened to a cutting edge in front. To the bottom of this is fitted a torpedo-shaped mole of the usual type. The cutting depth is about 18 in. in one case and 22 in. in the other, but additional depth is secured by throwing out one or two furrows with an ordinary plough along the line of the proposed drain before using the mole. The distance between the drains is determined to a great extent by the width of the "lands" or "stitches," but about 5 yards is common.

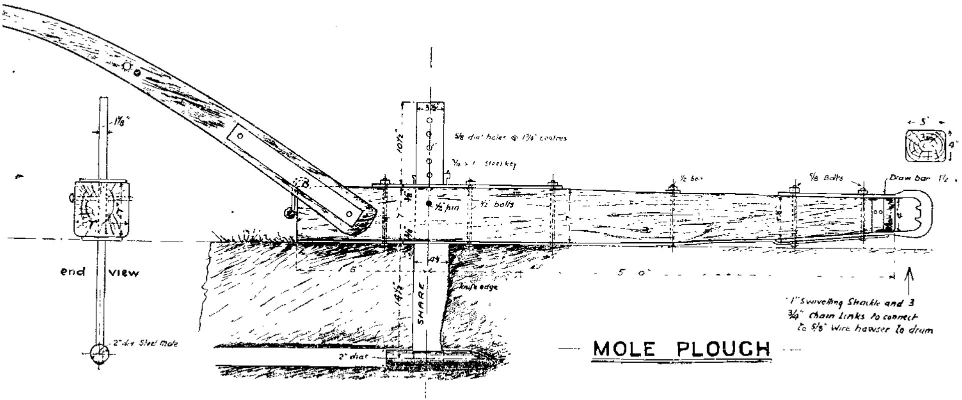


FIG. 1.—Details of Mole Plough (scale [illegible] in. to 1 foot). Above: Plan of underside, showing sole-plate. Below: Vertical section.

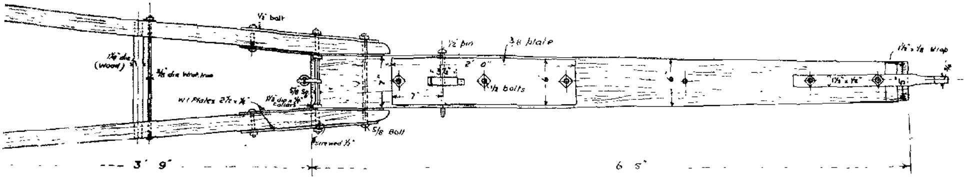


FIG. 2.—Details of Mole Plough (scale ⅛ in. to 1 foot). Horizontal section.

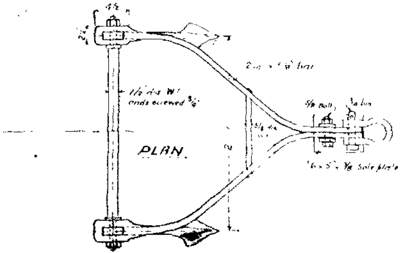


FIG. 3.—Plan of Anchor.

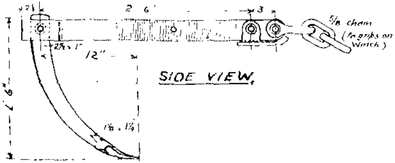
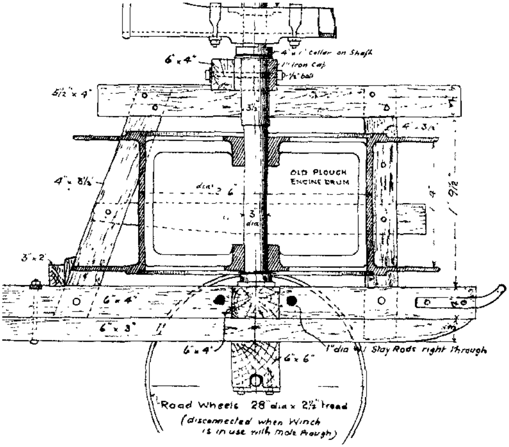
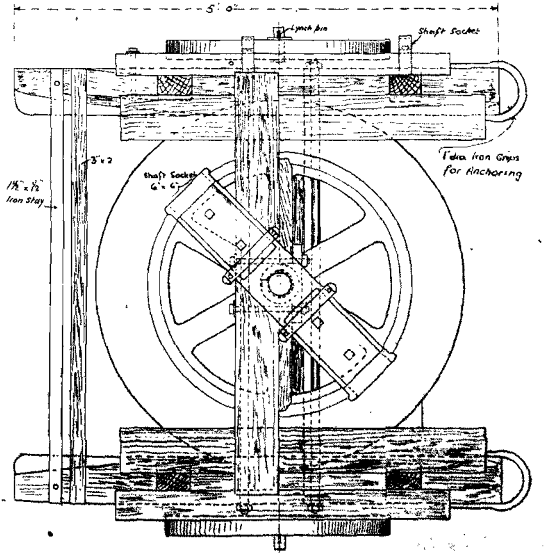


FIG. 4.—Side View of Anchor.



Collar on Shaft
6" x 4"
Iron Cap
5½" x 4"
OLD PLOUGH
ENGINE DRUM
4" x 8½"
3" x 2"
6" x 4"
6" x 3"
6" x 4"
6" x 6"
Stay Rods right through
Road Wheels 28" dia x 2½" tread
(disconnected when Winch
is in use with Mole Plough)



5' 0"
Lynch pin
Shaft Socket
3" x 2
1½" x ½"
Iron Stay
Shaft Socket
6" x 6"
1" dia Iron Grips
for Anchoring

The mole-plough is drawn up the field by means of a steel rope attached to a winding drum. In one of the ploughs this is a drum taken from an old ploughing engine; in the other the drum is made of wood encased in iron. In both cases the drum is fixed to a vertical spindle in the centre of a stout wooden framework. This is provided with two iron anchors to hold the winch firmly in position when the cable is being wound in. The Essex plough has, in addition, two struts, the extra support probably being necessitated by the fact that in this machine the road wheels are not detached from the winch when ploughing is being done.

The winding is done by two horses (occasionally three may be required) yoked to the pole or shafts fitted to the top of the spindle. They move round and round just as in working the ordinary horse-gear attached to a chaff-cutter or other farm machinery. Two men are required, one to hold the plough, the other to look after the horses and see that the rope is wound on properly. When one drain has been completed one horse drags the winch to the top of the next drain, the other drags the plough back to the bottom of the field. If the drain is of greater length than the cable, the winch must be fixed first at an intermediate position and afterwards moved to the top of the drain when all the cable has been wound in. In all cases the plough should be first let into the ground at the lower end of the drain.

The procedure is similar to that adopted when draining by steam-tackle. The outlet is first fixed and then the main drain is laid. As a rule, pipes are used for this and also for the first few feet of the minor drain in order to have a good junction with the main. A hole or eye is left at the point when the mole-drain is to start and the coulter of the mole-plough is inserted into this.

The accompanying drawings show the essential features of the Buckinghamshire plough which was constructed at a low cost by a local blacksmith and joiner. The Essex plough was also practically rebuilt locally but its origin is unknown. It is not suggested that such ploughs should be used where steam-tackle can be employed, as the latter is much more expeditious; but where it is not available, or for various reasons cannot be used, ploughs of the kind illustrated might with great advantage be constructed. The saving as compared with pipe-draining is immense, as 2 men and 2 or 3 horses do an acre a day.

This does not include the preliminary ploughing or the subsequent replacement of the furrow thrown out by the ordinary plough before the mole-plough is used.

THE CONTROL OF PESTS OF FRUIT TREES IN GARDENS AND SMALL ORCHARDS.

TO KEEP FRUIT TREES FREE FROM PESTS IS AS IMPORTANT AS DIGGING OR HOEING.

IN the following calendar **bold type shows the minimum** work which must be done to make sure that fruit trees escape the attacks of their chief pests. To make still more certain the work indicated in ordinary type should also be performed.

GENERAL ROUTINE OF WORK.

To be supplemented by special methods when epidemics occur.

Month.	Kind of Fruit.	Application.	Reason.
October ..	All trees ..	**Grease Band** (1)	To catch female Winter Moths (2).
Oct.–Nov.	All trees and bushes.	**Prune**	Cut out all diseased wood.
Dec.–Feb.	All trees ..	Caustic Soda or Lime-Sulphur	Apply once in three years to keep the trees clean.
March ..	Apples, pears, plums.	**Lime-Wash** .. or	*Lime Wash* cleans the trees and also prevents Aphis (3) and Apple Sucker eggs from hatching: apply it when the buds are opening.
April ..	All trees ..	**Nicotine and Soap.**	Apply just before flowers open if attacks of Caterpillars, Aphis or Apple Sucker are anticipated, and the trees do not require cleaning.
April ..	All trees ..	Arsenate of Lead.	Apply directly flowers have fallen, if Caterpillars are still causing trouble.
End of April or May.	Apples and pears.	**Bordeaux Mixture or Lime-Sulphur.**	1st application to prevent Apple and Pear Scab (4) and American Gooseberry Mildew (5). Spray directly the petals have fallen. Make a second and third application (if necessary) at intervals of 3 weeks.
April ..	Gooseberries	Lime-Sulphur ..	

(1) See Food Production Leaflet No. 12 (*Grease-Banding of Fruit Trees*).
(2) See Leaflet No. 4 (*Winter Moths*).
(3) See Leaflet No. 308 (*Plum Aphis*).
(4) See Leaflet No. 121 (*Apple and Pear Scab*).
(5) See Leaflet No. 195 (*American Gooseberry Mildew*).

THE CONTROL OF PESTS OF FRUIT TREES IN GARDENS AND SMALL ORCHARDS.—The object of this article is to describe the best and simplest methods of preventing the common pests of fruit trees from causing widespread damage to trees and fruit.

In controlling fruit-tree pests it is, of course, of great importance that the identity and life history of each pest should be known. Information on these points may be obtained from the various leaflets to which reference is made in this article; but in cases of difficulty specimens for identification should be sent either to the nearest Agricultural Institution or to The Director-General, Food Production Department, 72, Victoria Street, S.W. 1.

The packages containing the specimens should be marked plainly: "*Pathological Laboratory*," and, whenever possible, a piece of the plant showing the nature of the damage should be sent, together with examples of the pest. The specimen should be packed in a tin box, so that the contents may arrive in fresh condition. No holes should be made in the box.

Methods of Controlling Pests.—The chief pests of fruit trees are certain insects and lowly forms of plant life known as fungi. In addition to insect and fungus pests, mosses and lichen which grow on the bark also do damage, particularly by harbouring insect pests.

The insect pests which attack fruit trees are of two kinds:—

1. Biting insects, that is to say, insects which eat the solid parts of the plants, as, for example, the leaves, using their jaws to bite off their food.
2. Sucking insects, that is to say, insects which make punctures in the surface and suck the sap through a trunk or proboscis. Sucking insects have no biting jaws.

This distinction between biting and sucking insects is important from the practical point of view. Insects which bite their food may be destroyed if the fruit tree which they attack is sprayed with an "internal poison insecticide," that is to say, an insecticide which on drying leaves a film of poison on the surface of the leaves and other vulnerable parts of the tree. The biting insect sooner or later eats the poison thus deposited and is destroyed. The insecticides used as internal poisons are often harmless to insects unless they are actually eaten. This point is worth mentioning, owing to the fact that those who use these internal poison insecticides are surprised when they find that an insect pest dipped into the poison is not killed.

For sucking insects internal poison insecticides are useless, for the insects feed on the sap of the plant, and the poison sprayed on the surface never reaches the sap. A different type of insecticide is therefore necessary, and the insecticide which is used for destroying sucking pests is of the type known as a "contact insecticide." Such an insecticide only kills the

insects which it actually touches. It destroys either by poisoning them through their breathing pores or by enveloping them in a substance which prevents them from breathing or moving.

Therefore as a general rule for biting insects, such as caterpillars or beetles which are causing damage, use an "internal poison insecticide," but when the fruit tree is attacked by sucking insects such as Aphides (green fly), a "contact insecticide" must be used.

Cleansing Washes.—In order to get rid of the moss and lichen which accumulate on tree trunks, and serve as harbouring places for insect pests, a cleansing wash should be used either in the winter or early spring. A cleansing wash will also serve to destroy a certain number of insect and fungus pests.

Another practice which will help to keep fruit trees clean is the systematic gathering of fallen fruit, for many pests which feed inside fruits cause the fruit to fall prematurely, and in these cases the insect pest, usually in the grub stage, is contained within the fallen fruit. Therefore if the fruit is not fit for human consumption it should either be given to pigs, thrown on the bonfire, or buried so deeply as to kill the grubs and so reduce the chance of an attack next year.

Fungus Pests.—The two chief measures to be taken to reduce the damage done by fungi which attack fruit trees are, first, the pruning out of dead or dying twigs and branches and, second, spraying with a suitable fungicide. The importance of pruning in keeping down the fungus pests is due to the fact that many of the fungi which attack fruit trees make their way into the tissues of the twigs and branches. When they have penetrated into these tissues they cannot be reached or destroyed by spraying, hence the only remedy is to cut out and burn the diseased portions, taking care to cut back to healthy wood. If this is not done the fungus continues to live, and by producing spores it may give rise to infection in other parts of the same tree or in other trees near by. These spores or fungus seeds are produced at certain times of the year on the surface of the diseased twigs, branches or leaves. If the fungicide is applied at the right time, many spores on the point of germinating will be killed outright; moreover, the spray fluid on drying forms a thin film of poison on the plant which is then protected from any fungus spores which may fall upon it and begin to grow. The essence of this treatment, therefore, is to apply the fungicide before the fungus has had time to reach or begin to grow on the plant.

In addition to this preventive spraying, it may be possible in certain cases when the fungus lives on or near the surface of the plant, as for instance in the case of the mildews, to check the disease by spraying after the fungus has begun to develop, but even here, owing to the difficulty of wetting a thick felt-like covering of fungus, it is preferable to spray as a preventive rather than a cure.

Pests Here Dealt With.—The following is a list of the crops and pests dealt with in this article :—

APPLE :

Insects—
(1) Winter Moths (*a*).
(2) Other moths whose caterpillars attack foliage.
(3) Codling Moth (*b*).
(4) Aphides (green fly, black fly, including Woolly Aphis) (*c*).
(5) Apple Sucker.
(6) Capsid Bug.
(7) Mussel Scale.

Fungi—
(8) Scab (*d*).
(9) Brown Rot.
(10) Blossom Wilt (*e*).
(11) Canker (*f*).
(12) Apple Mildew (*g*).

Note.—The insect pests numbered 1, 2 and 3 are biting insects, and those numbered 4, 5, 6 and 7 are sucking insects.

PEAR :

Insects—
(1) Winter Moths.
(2) Other moths whose caterpillars attack foliage.
(3) Slugworms.
(4) Aphides.

Fungi—
(5) Scab.
(6) Brown Rot.

PLUM :

Insects—
(1) Winter Moths.
(2) Other moths whose caterpillars attack foliage.
(3) Aphides (*h*).

Fungi—
(4) Brown Rot.
(5) Silver Leaf (*i*).

CHERRY :

Insects—
(1) Winter Moths.
(2) Other moths whose caterpillars attack foliage.
(3) Aphides.

Fungus—
(4) Brown Rot.

GOOSEBERRY :

Insects—
(1) Sawfly (*k*).
(2) Brown Scale.
(3) Red Spider.

Fungus—
(4) American Gooseberry Mildew (*l*).

BLACK CURRANT :

Insects—
(1) Big Bud Mite (*m*).
(2) Aphides.

STRAWBERRY :

Fungus—
(1) Mildew.

There are many other pests which attack these crops, but they are omitted either because they are of little importance or because they are exceedingly difficult to control and cannot be dealt with by general measures. For similar reasons

(*a*) See Leaflet No. 4.
(*b*) ,, ,, ,, 30.
(*c*) ,, ,, ,, 34.
(*d*) ,, ,, ,, 131.
(*e*) ,, ,, ,, 312.
(*f*) ,, ,, ,, 56.
(*g*) See Leaflet No. 204.
(*h*) ,, ,, ,, 308.
(*i*) ,, ,, ,, 302.
(*k*) ,, ,, ,, 12.
(*l*) ,, ,, ,, 195.
(*m*) ,, ,, ,, 1.

certain well-known crops, such as raspberries and red currants, are also passed over.

Formulæ for Making Washes.—In the preceding section mention has been made of

(1) Cleansing washes, (3) Fungicides,
(2) Insecticides,

and it is convenient to deal with these classes separately, though it must not be forgotten that one wash may have a double value—for instance, a lime wash is both a cleansing wash and an insecticide, while lime-sulphur, generally used as a fungicide, has also insecticidal and cleansing properties.

1. *Cleansing Washes.*—Where trees are overgrown with moss and lichen a cleansing wash should be used. Washes made according to the first (*a*) and third (*c*) are applied during the winter and early spring, before the buds have burst. Lime wash (*b*), however, may be applied at any time until shortly before the blossoms open—the later applications having greater insecticidal value.

(*a*) Caustic soda	2 lb.
Water	10 gal.

The best form of soda to use is "powdered" caustic soda, purity 98 per cent. Dissolve in a little water and dilute to the proper strength. In the application of this wash great care must be taken that it does not touch the hands or face as it is extremely caustic. Thick gloves, preferably of rubber, should be worn. Caustic soda is likely to be very scarce and, except in the worst cases, one of the other cleansing washes should be used.

(*b*) Best quicklime	10–15 lb.
Water	10 gal.

Obtain only the best quicklime and store carefully to prevent it from air-slacking. Builders' lime, which is often partially air-slaked, should not be used.

Slake the lime with a little water and when slaked into a fine powder add the remainder of the water, stirring vigorously the whole time. Strain at least twice through sacking before filling the spraying machine. Keep well agitated throughout the application. This wash should be used freshly prepared.

(*c*) Lime-sulphur (1·3 sp. gr.)	3 qt.
Water	10 gal.

Add the concentrated lime-sulphur (1·3 sp. gr.) solution, which may be bought ready-made, to the water and stir well. This wash should be used freshly prepared. Never use a

spraying machine with any copper parts as the lime-sulphur reacts with the copper.

When lime-sulphur washes are used in the summer they should not be of this strength but diluted as given on p. 48.

2. *Insecticides.*—These washes have already been divided into "contact" insecticides and "internal poison" insecticides.

(*a*) *Internal Poisons.*—Internal poisons act by poisoning the insects' food. They are used for all the leaf-eating pests. Arsenate of lead, in paste form, is recommended. The formula is: lead arsenate paste, ½ lb.; water, 10 gal.

This wash should be applied in a fine spray. The object should be to wet all the leaves without drenching them, so that when the leaves have dried they will be covered uniformly with poison.

Full details for making this wash are given on the jar containing the paste.

(*b*) *Contact Insecticides.*—These kill insects, not by poisoning their food but by contact with their bodies. To attain this, the washes should be applied with as much force as possible and with a coarse spray.

A wash containing nicotine is advised. Although expensive it is the most effective contact poison. It also has considerable value against caterpillars when young.

Soap should be added, not only for its insecticidal properties but chiefly because it causes the wash to "run" on the leaves instead of remaining in drops.

Nicotine may also be used in combination with lime-sulphur or arsenate of lead, the nicotine being added to the diluted lime-sulphur or lead arsenate wash at the rate of ¾ oz. to each 10 gal. of wash; in these cases no soap should be used.

The formula for nicotine soap wash is:—

Nicotine	¾ oz.
Soap (soft)	½ lb.
Water (soft)	10 gal.

If the water is hard, 1 lb. of soap should be used. Dissolve the soap in hot water, dilute to the required strength, add the nicotine and stir well. If soft soap is unobtainable hard soap should be used instead. There are many satisfactory proprietary contact insecticides on the market which may be used instead of this wash.

Nicotine is a very Deadly Poison and great care must be taken when using it. Empty nicotine bottles must be destroyed. Nicotine washes, however, only retain their poisonous properties for a few days after having been sprayed on trees.

NOTE.—**Nicotine and Lead Arsenate are Powerful Poisons.** Lead arsenate should not be used where vegetables are grown underneath fruit trees, or where gooseberries are grown, if the fruit is to be picked green. If nicotine is applied, a fortnight should be allowed before the vegetables or green fruit are gathered.

3. *Fungicides.*—Bordeaux mixture or lime-sulphur (summer strength) are recommended. Burgundy mixture—the usual *potato* spray-fluid—made from copper sulphate and washing soda, should *not be used*, as it often causes scorching.

Fungicides should always be applied as preventives rather than as remedies. Attacks by fungus develop rapidly, and appear to a greater or less extent each year according to weather conditions, and when once a disease is rampant it is difficult to check and control. The best way to prevent an attack is to cover the vulnerable parts of the tree—the leaves, fruit and young wood—with a fungicide, and in this way prevent the development of the disease.

To obtain this protective covering, the fungicide should be applied as a very fine spray. Spraying should cease as soon as the leaves begin to drip.

It is usual to give one or two applications of the fungicide, but in cases where a bad attack is expected three applications are required. The first application should usually take place as soon as the petals have fallen and the remaining applications at intervals of three weeks.

(*a*) *Bordeaux mixture* :—

Copper sulphate	13 oz.
Best quicklime (90 per cent. Cao)	13 „
Water	10 gal.

Dissolve the copper sulphate in water at the rate of about 1 lb. to 1 gal. This should be done in a wooden receptacle. Slake the lime to a fine powder with a little water in another receptacle. Add water gradually to make a "milk," and then dilute to the required amount (9 gal.) stirring well throughout.

Pour the copper sulphate solution into the diluted milk of lime and stir for about 5 minutes. Use the mixture within 24 hours and preferably as soon as made.

(*b*) *Lime-sulphur* (summer strength) :—

Lime-sulphur (1·3 sp. gr.)	3 pt.
Water	10 gal.

Pour the lime-sulphur into the water and stir well. Use this wash freshly prepared.

On certain varieties of apples and gooseberries (see pp. 49 and 51) Bordeaux mixture and lime-sulphur (summer strength) should not be used as they are liable to cause leaf-scorching, and lime-sulphur at half summer strength should then be substituted. It is made as follows :—

Lime-sulphur (1·3 sp. gr.)	1½ pt.
Water	10 gal.

Plan of Operations.—The general *winter* treatment by pruning out dead wood, etc., has already been indicated. During the pruning dead fruits as well as the prunings must be collected and burnt, and on no account be left on the trees. Parts of apple and pear trees affected by canker should be cut or pared away and the wounds dressed with Stockholm tar; this substance is also useful for applying to large wounds made in pruning. Wood affected by Apple and Pear Scab* or Brown Rot† must also be cut away and burnt, and the same treatment applied to twigs of apple trees attacked by Apple Mildew‡, and gooseberry bushes attacked by the American Gooseberry Mildew§.

If the trees are overgrown with moss and lichen use a caustic wash, but in most cases, in view of the scarcity of caustic soda, a lime wash applied later is preferable. Lime-sulphur at winter strength may also be used instead of these washes, but it has less insecticidal and cleansing effect except for Brown Scale attacks on gooseberries and currants.

Apart from the above winter treatment each crop must be dealt with separately.

Apple.—If the trees are somewhat mossy and require cleaning a lime wash should be used—at any time from the middle of March until a week before the blossoms open. Late lime washing may cause a slight browning of the opening leaves, but the injury is not of importance, and the late applications should check to a large extent both *Aphides* and *Apple Sucker*. *Winter Moth* is troublesome in most seasons, and may be dealt with in two ways. First, a nicotine-and-soap spray applied just before the blossoms open will give a fair control of Winter Moth, and will also destroy Aphides, Sucker, and Capsid Bugs.‖ Therefore, when lime wash has not been used, a nicotine-and-soap spray is especially valuable. Secondly, if lime wash has been applied, then Aphides and Sucker are less likely to do

* See Leaflet No. 131.

† " " " 312.

‡ See Leaflet No. 204.

§ " " " 195.

‖ In order to control this troublesome pest effectively a second spraying with nicotine and soap should be given as soon as the petals have fallen.

harm, and it is possible to concentrate on the Winter Moth by using lead arsenate either just before or just after the blossoming period (on no account when the flowers are open).

All other caterpillars may be destroyed by lead arsenate, and when young a good percentage may also be killed by nicotine and soap. After the petals have fallen, in gardens where Scab is bad, the trees should be sprayed with Bordeaux mixture or lime-sulphur, but it must be remembered that certain varieties are liable to damage by Bordeaux mixture, as for example: *Cox's Orange Pippin, Duchess' Favourite, Beauty of Bath, Gladstone, Miller's Seedling*, and *Lady Sudeley*.

For these varieties, with the exception of Cox's Orange Pippin, lime-sulphur at summer strength should alone be used. Cox's Orange Pippin should only be sprayed with lime-sulphur at half summer strength.

To obtain an efficient control of *Scab* (*a*) it will probably be necessary to apply a second spraying three weeks after the first. It is worth noting that for the control of caterpillars, lead arsenate may be used in combination with either lime-sulphur or Bordeaux mixture, the lead arsenate paste being added at the rate of ½ lb. to each 10 gal. of the diluted fungicide mixture. If *Scab* is not troublesome, spraying should seldom be required after the apples have begun to swell. During the summer, dead trusses of bloom killed by *Brown Rot* or *Canker* (*b*) should, as far as possible, be removed altogether with the diseased spurs. If the *Codling Moth* is bad, as may be judged by the presence of many worm-eaten apples during the previous autumn, bands of hay or old sacking should be put round the trunks of the trees in July. The larvæ make their cocoons in the hay or sacking and may be destroyed by removing and burning the bands in winter.

Throughout the season a watch should be kept for *Woolly Aphis* (*American Blight*), and this insect should be dealt with by brushing the affected spots with a little paraffin. Methylated spirit is safer in the case of young trees, but it is difficult to obtain, and on such trees, soap and water used vigorously will do. Finally, at the end of September, the trees must be "grease banded" to catch female *Winter Moth*, and so reduce the pest the following year.

Pear.—The measures described above apply also to the insects listed as attacking pear. There are, however, certain other pests such as the *Pear Leaf Blister Mite* (*c*) and *Pear*

(*a*) See Leaflet No. 131. (*b*) See Leaflet No. 312. (*c*) See Leaflet No. 239.

Midge (*a*) for which special treatment is required, and for the treatment of these reference should be made to leaflets.

Plum.—The plum, so far as spraying is concerned, differs from the apple in that the blossoms open much earlier in the season, before the leaves have expanded. Lime wash is nevertheless equally effective against Aphides and may be applied at any time until the blossoms are about to open—for preference within a fortnight or three weeks of that time. If lime wash is applied then, the chief insect pests which remain to be dealt with are the caterpillars of *Winter* and other *Moths*. Lead arsenate is the best insecticide to use, but it is necessary to wait until after the blossom has fallen and the foliage has developed. If lime wash has not been used, an attempt may be made to deal with both caterpillars and Aphides by spraying with nicotine and soap within a fortnight after the petals have fallen. In this case it is not wise to delay too long, as Aphides cause leaves to curl very rapidly and caterpillars are most susceptible to nicotine when quite young. A second application of either lead arsenate or nicotine may be needed if caterpillars or Aphides develop later, but if the work is well done early in the season this should seldom be required. As in the case of apples, grease banding should be carried out towards the end of September,

In the case of *Brown Rot* (*b*), diseased shoots and dead, mummified fruits should be removed and burnt. Similarly, in the case of *Silver Leaf* (*c*) affected branches must be cut right out—cutting back to clean, healthy wood and dressing the wound with Stockholm tar. If this work is not carried out before the leaves have fallen, the affected trees and branches must be marked or they may be passed over when pruning in winter. Dead branches or trees killed by Silver Leaf must be burnt as soon as possible. This will remove sources of fresh infection as the fungus only produces spores on the dead wood.

Cherry.—Lime washing may be carried out as in the case of the apple if the trees are dirty. *Winter Moth* should be controlled by grease banding and by the use of lead arsenate after the petals have fallen and as soon as the leaves have developed.

Black Aphides are specially troublesome on wall trees, and as soon as signs of the pest are seen a thorough washing with nicotine and soap should be given; this species of *Aphis* is troublesome to control, and should be dealt with before the

(*a*) See Leaflet No. 53. (*b*) See Leaflet No. 86. (*c*) See Leaflet No. 302.

tree is thoroughly infested. Shoots attacked by ***Brown Rot*** should be cut out, as in the case of other fruit trees.

Gooseberry.—Twigs attacked by ***American Gooseberry Mildew*** (*a*) should be cut out and burnt during the early autumn. When Brown Scale is troublesome, a winter washing with lime-sulphur (winter strength) should be given. In gardens badly affected by American Gooseberry Mildew the bushes, with the exception of certain varieties mentioned below, should be sprayed towards the end of April with lime-sulphur at summer strength, care being taken to spray both sides of the leaves as far as possible. A second application should, if possible, be given two or three weeks later.

The following varieties are damaged by lime-sulphur at summer strength, and half summer strength should be used; *Berry's Early, Freedom, Lancashire Lad, Crown Bob.*

The following varieties cannot safely be sprayed with lime-sulphur at all: *Yellow Rough, Valentine's Seedling.*

Gooseberry *Sawfly* is likely to prove troublesome, and in small gardens can be dealt with by hand picking if taken in time. When first hatched the larvæ live together in colonies, and the attacked leaves, with the entire colonies, can be picked off and destroyed before damage is done. Lead arsenate is thoroughly effective as a spray, but must not be used within a month of the time when the fruit is to be gathered. *Aphides* on the twigs may be dealt with by cutting off the stunted tips or by thoroughly washing them with nicotine-and-soap solution.

Black Currant.—The pest which as a rule attracts most attention in small gardens is the ***Big Bud Mite.*** The swollen buds should be picked off as soon as they can be detected, at all events before the end of February. As a further measure bushes should be pruned so that they fruit as much as possible on the one-year old wood, and this may be obtained by cutting out each winter most of the wood older than one year. Prune out the old wood as close to the ground as possible so as to obtain strong young growth.

Strawberries.—The plants sometimes suffer severely from *Strawberry Mildew.* As soon as the disease appears dust the plants with "flowers of sulphur," and repeat the treatment if necessary. A small bellows sulphurettor may be employed in small gardens, or, if it is not available, the sulphur may be shaken out of a loosely-woven bag attached to a stick. The treatment does not in any way harm the fruit for eating purposes.

(*a*) See Leaflet No. 195.

Spraying Machines.—There are two main types of spraying machines suitable for use in allotments or small holdings. They are

(*a*) Knapsack machines. (*b*) Small-wheel manual machines.

Knapsack machines are the most widely used for this purpose. They are the cheapest kind of machine obtainable, and are suitable for spraying all kinds of fruit trees, potatoes and other vegetables. For large standard trees a long lance attachment can be fitted, but it is found that the pump is not sufficiently powerful to maintain the high pressure necessary to carry out this work thoroughly.

Where it is desired to spray an orchard of large standard trees, some type of small-wheel manual machine is recommended. These machines are suitable for all work for which a knapsack is used, and have powerful pumps fitted to them, so that the tops of large trees can be reached with ease. This type of machine is very much more expensive than the knapsack type, but is much more durable and useful if a considerable amount of spraying has to be done each year.

The Knapsack.—These machines, as their name implies, are carried on the back by means of shoulder straps.

They have a container holding about 3½ gal. of fluid, and usually made of plain or tinned copper. The former is least expensive, but cannot be used for a lime-sulphur spray, for which a tinned copper machine must be used, or a machine with a container made of some chemically-resistant alloy.

Fitted to the container is a short length of hose, and attached to this is a brass lance about 3 ft. long. The nozzle is fitted to the end of the lance. For spraying large trees as previously mentioned, a bamboo lance 5 to 6 ft. long can if necessary be fitted to replace the metal one. All spraying machines are fitted with strainers.

The power for spraying is obtained by means of —

(*a*) *An internal pump* which is fitted to the base of the container. Its action is similar to a pair of bellows. The valves are rubber, and when perished can easily be replaced. The present price of this type of machine is 70*s*.

(*b*) *External pump*, which is fitted to the right hand side of the container and is of the ordinary plunger type. The valves are of metal, and are in such a position that they can easily be inspected. This type of machine also costs 70*s*.

(*c*) *Pneumatic pressure*, which is obtained from an air pump fitted inside the container. These machines must be fitted with a pressure gauge and safety valve, and for this reason are expensive and difficult to obtain at the present time. The present price is £[illegible] 13*s*.

FIG. 1.—Knapsack Machine (External Pump Type) with short metal lance at work.

FIG. 2.—Adjustable Nozzle: "Mistifier Type."

FIG. 3.—Adjustable Nozzle with degorger (A); "Vermorel Type."

Small Wheel Manual Machine.—This type of machine consists of a galvanised metal container holding 12 or 18 gal., mounted on one wheel, wheel-barrow fashion. The pump is of the plunger type, fitted with an air chamber and metal valves. A pressure of 60 to 70 lb. per sq. in. can easily be maintained. There is a single or double lead of rubber hose 20 ft. long. A metal 2-ft. 6-in., or bamboo 5-ft., lance can be fitted to the hose to suit requirements. The cost is at present £13 10s. for the 12-gal. type and £14 14s. for the 18-gal. machine.

Nozzles.—These are fitted to the lance to split up the jet obtained by means of the pump into either a coarse or very fine spray to suit the requirements of the fluid which is to be applied. There are many types on the market. Those which can be adjusted to give either a coarse or a very fine spray are recommended.

Care of Spraying Machinery.—All the fluids used for the control of insects or fungi have either a strong corrosive effect on the metal or rubber used in making the machine, or else have small particles in suspension which wear away the valves and plungers rapidly.

In these circumstances, always make a point of carefully straining the spray fluid at least twice before pouring into the container. Keep all the working parts of the machine well oiled.

Always thoroughly wash out the container and pump with clean water after use.

How to Obtain Spray Chemicals.—It must be remembered that arsenate of lead and nicotine are poisonous compounds. These substances can, therefore, only be obtained from firms licensed to sell poisons. To comply with the law, every person who requires them has to sign the "poison book." The local chemist should therefore be asked to obtain a supply from a firm of wholesale horticultural sundriesmen.

The other chemicals which may be required can be obtained in a similar manner. They are also stocked in many districts by firms supplying horticultural requisites, agricultural merchants, grocers, and ironmongers.

Leaflets.—The leaflets mentioned in this article are issued by the Board, and may be obtained free of charge by writing to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. They give full details of the life history, diagnosis and control of the various pests to which they relate.

NOTE.—*The foregoing article is also issued in the form of Food Production Leaflet No.* 39.

FURTHER OBSERVATIONS ON THE CAPSIDS WHICH ATTACK APPLES.

F. R. PETHERBRIDGE, M.A., and M. A. HUSAIN, B.A.

(School of Agriculture, Cambridge.)

ARTICLES which have already appeared in this *Journal* (Fryer, January, 1916; Fryer and Petherbridge, April, 1917) give accounts of observations on the life history of the Capsids which attack apples, describe the nature of the damage, and show that the injuries are due mainly to "*Plesiocoris rugicollis*," and that the only other capsid possibly doing damage is "*Orthotylus rugicollis*."

The investigation of which an account is given below was undertaken to determine the exact damage done by the different capsids in their various stages, and fuller details concerning their life histories.

The season of 1917, in which most of the observations were made, was rather an exceptional one, the early spring being very cold and followed by fairly warm weather, a state of affairs most likely to produce late and more uniform hatching. These observations were made chiefly in the Walton district near Wisbech and some were made in orchards near Cambridge.

Plants on which obvious Capsid markings were noticed were willows, apples, black and red currants and potatoes.

The different varieties of apples suffer in different ways. All those in the affected areas were attacked, but some suffer more than others. On Lady Hollendale, Worcester Pearmain, Lord Grosvenor, Lane's Prince Albert and Lord Derby the fruit was badly marked. On Grenadier, the young leaves of the early stage were badly marked and the trees were much checked, but only in cases of severe attacks was the fruit badly marked. In quick-growing varieties, like Bramley's Seedling and Early Victoria, the damage was not so severe when the fruit was ready to pick.

Species Studied.—The species of Capsids studied were the four found by Fryer, *viz.*, *Plesiocoris rugicollis*, *Orthotylus marginalis*, *Psallus ambiguus* and *Atractotomus mali*. All four were found on most of the affected trees, but the last three were also found in unaffected orchards near Cambridge. On the affected area the green bugs (*Plesiocoris rugicollis* and *Orthotylus marginalis*) were present in large numbers. The brown bug (*Psallus ambiguus*) was also fairly abundant, whilst a sprinkling of the smaller red bug (*Atractotomus mali*) was also found.

The Capsids damaging potatoes were different from the above species, the chief culprit being *Calocoris bipunctatus*, which was not found on apple trees but which damages the potato leaves in much the same way as *Plesiocoris rugicollis* does apple leaves.

Method of Investigation.—The method of determining which of these capsids caused the damage consisted in collecting specimens at their various stages from the affected trees and putting them on shoots enclosed in a muslin cover to prevent them from escaping (sleeving), or of putting them on healthy shoots kept in water in breeding cages. Some were also hatched from shoots in the laboratory and treated in a similar manner. By these methods it was found that *Plesiocoris rugicollis* was the only Capsid which caused the marking of the leaves, fruit or shoots, and that the other bugs did no damage of importance.

Plesiocoris rugicollis.—The eggs of this species were found completely buried in the shoots (see Fig 1), either in the breathing pores or in the smooth bark, but we were unable to find them by a surface examination. On the bark being peeled off the eggs were discovered sticking to the underneath side of the bark, and it was then found that it was sometimes possible to see those which were laid in the breathing pores from the outside, but only on very clean shoots and with a high-power lens.

The eggs are creamy in colour, about one-eighteenth of an inch long, curled as shown in Fig. 1, and entirely buried in the stem, none of the egg being above the surface of the stem.

These eggs are laid in the shoots in June and July and remain there until the following spring, when the young bugs hatch out. In the laboratory, in 1917, the young bugs started to hatch out on 5th May, but this date is much later than usual, as Fryer records them as hatching, in 1913, before 14th April, while in 1916 a few newly-hatched bugs were found on 25th April. In 1917 the bugs continued to hatch out until 13th May. This hatching period is probably much shorter than the usual one, owing to the peculiar season.

The varieties Early Victoria, Lord Grosvenor and Lady Hollendale were in full bloom on 23rd May, much later than normal, so that the conditions which retard the hatching of the bug also appear to retard the blossoming period. A visit to Wisbech on 7th May revealed the presence of some very small newly-hatched bugs, and markings on some of the young leaves, the largest of which at this stage were about an inch long.

As soon as the young bugs hatch they stick in their beaks and begin to feed on the very young leaves, soon causing a large number of the characteristic punctures shown in Fig. 2.

The young bugs are about $\frac{1}{18}$ in. long, yellowish-green in colour, and have pink tips to their feelers. They are very active, and when disturbed run away very quickly and conceal themselves. In some varieties of apple, notably Lord Derby, the leaves remain more curled than in others, and provide more shelter for the bugs. As the time of moulting approaches the young bugs become very sluggish and do not feed, and about six days after hatching they cast their first skin. They then again begin to feed voraciously, and in about eleven days from hatching they cast their second skin. In this way they cast their skin five times, living about six days in each stage. The young bugs become bigger and greener at each successive moult.

The second and third stages are very similar to the first stage, but in the third stage very slight projections are noticeable on the second and third segments behind the head. In the fourth stage these projections or wing-pads are larger and reach to the fifth segment. In the fifth stage the bugs are about one-sixth of an inch in length and the wing-pads are still larger and reach to the seventh segment. At the sixth stage the bugs are fully winged, nearly one-fourth of an inch in length and have wings reaching well beyond the body. From the time of hatching until the bugs become adults takes about 30 days. Although the adults are capable of flying we never observed them doing so under normal conditions, but when disturbed they flew back into the tree, or into neighbouring trees, or on to the ground.

The females laid their eggs in the bark of young shoots during the latter part of June and the first half of July. By 21st July all the adults had disappeared, so that the adults are only present for about 7 weeks. The eggs remain in the shoots until the following spring, when the young bugs hatch out.

Injury to Fruit and Leaves.—Owing to the different dates of hatching several stages of the bug may be present at the same time. When the fruit set the bugs were in the third, fourth and fifth stages, and shortly after this—on 28th May—they began to injure the fruit and continued to do so until the apples were about an inch in diameter. Even when the fruit is set the bugs continue to feed on the leaves as well. Most of the damage to the fruit is done soon after it sets by the fourth and fifth stages. The adult feeds mainly on the young

FIG. 1.

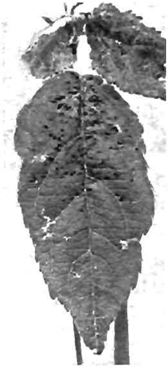


FIG. 2.

FIG. 6.

FIG. 3.

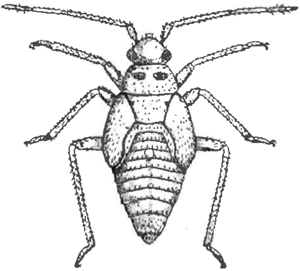


FIG. 5.

FIG. 4.

g. 1.—Egg of *Plesiocoris rugicollis* in a young shoot. Fig. 2.—Apple leaves marke
icollis. Fig. 3.—*P. rugicollis* just after hatching from the egg. Fig. 4.—*P. rugic*
age, *i.e.*, after the 2nd moult. Fig. 5.—*P. rugicollis*, 5th stage, *i.e.*, after 4th m
—Young apples marked by *P. rugicollis*. Figs. 1, 3, 4, and 5 highly magnified.

FIG. 1.

FIG. 2.

FIG. 6.

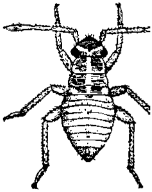


FIG. 3.

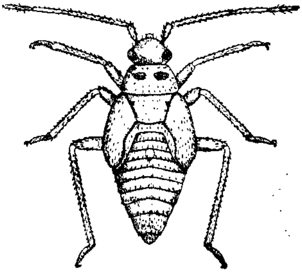


FIG. 5.

FIG. 4.

g. 1.—Egg of *Plesiocoris rugicollis* in a young shoot. Fig. 2.—Apple leaves marked
icollis. Fig. 3.—*P. rugicollis* just after hatching from the egg. Fig. 4.—*P. rugic*
age, *i.e.*, after the 2nd moult. Fig. 5.—*P. rugicollis*, 5th stage, *i.e.*, after 4th m
—Young apples marked by *P. rugicollis.* Figs. 1, 3, 4, and 5 highly magnified.

leaves and tips of the young stems. When the young stem is punctured a brown fluid oozes out, and the stem often cracks and is in some cases killed. This is very noticeable on young trees, on which side-shooting results, and the thick growth has to be cut away in order to keep the trees a good shape.

The injury to the fruit varies considerably. In the slower-growing varieties, like Lady Hollendale and Worcester Pearmain, the damage may be enormous, as badly-marked apples do not grow to one quarter of their ordinary size and often fall off. In quicker-growing varieties, like Bram ey's Seedling and Early Victoria, the fruit grows out of the injury more and, although scarred and peculiar-shaped apples may result, the reduction of the crop is not nearly so marked. In most of the varieties the punctured apples at the time of picking are russetted, owing to the scars formed by the healing of the punctures.

Other Species of Capsids.—The life history of the other three Capsids mentioned is very similar to that of *Plesiocoris rugicollis*, with the exception that they cause no damage to the fruit, leaves and shoot, and therefore have little interest for fruit-growers.

Psallus ambiguus hatches at about the same time as *P. rugicollis*, and *Orthotylus marginalis* about a fortnight later. In the adult stages these Capsids are readily distinguishable. *P. rugicollis* and *O. marginalis* are both green in colour and about one-fourth of an inch long. *P. rugicollis* is practically smooth, oval in shape, with orange-yellow edges down the outsides of both wings, and with a very small yellow collar between the head and the body. *O. marginalis* is hairy, and not oval in shape, its sides being almost parallel; it has no collar, and there is an orange spot underneath between the legs. *Psallus ambiguus* is brown in colour, but varies from a greyish-brown to a very dark-brown. It is about three-sixteenths of an inch in length. *Atractotomus mali* is reddish, and much smaller, measuring only about one-seventh of an inch in length. The lower part of its feelers are much swollen.

The young stages of these capsids are not so easily distinguished. *Atractotomus mali* is red, and therefore easily distinguished from the others. *P. rugicollis* and *Ps. ambiguus* begin to hatch at about the same time, whereas *O. marginalis* starts hatching about a fortnight later, and therefore most of the stages of the two former will be older than those of the latter —although it is possible in a season with a long hatching period that the late ones of the former will hatch at the same time as the earliest of the latter. The young stages of

P. rugicollis are green in colour, whereas those of *Ps. ambiguus* are of a dirty yellowish-green. Those of *O. marginalis* are green but may be distinguished by the presence of a very distinct orange spot in the middle of the upper s de of the body. The tips of the feelers in the young stages of *P. rugicollis* are of a pinkish colour, but are not so in the other two species.

The examination of the apple orchards near Cambridge showed that, except in one case, no damage was being done to apple trees by *P. rugicollis*, and that this species was not present on the apples. The other species were all present, and *P. rugicollis* was found to be damaging black and red currants and also willows near. It is interesting to note that in the Wisbech district this Capsid attacks apples, black and red currants and willows, whereas in some orchards near Cambridge apples are not attacked by them. At Great Evesden, near Cambridge, black and red currants have been attacked for several years, and in 1917 the row of apple trees (Worcester's) next to them was attacked, while there were a few marks on other varieties near At Histon, black currants under apple trees were badly attacked, whilst the apples were entirely free. We have also seen, both in Cambridgeshire and Norfolk, interlacing apple trees and black currants in which the black currants were attacked but not the apples.

From these observations it is difficult to say whether attacked black currants are likely to be a source of infection to the apple trees near, or how apples came to be infested in one district and not in another.

Some young bugs of the species *P. rugicollis* were taken from black currants which they were damaging and sleeved on healthy apple trees, while others were put on healthy apple shoots in cages. After a time they began to feed on the leaves and caused the characteristic markings. Some of them went through their moults and became adult on the apple. Young bugs of this species taken from apple trees and placed on black currants also reached the adult stage and caused damage similar to that done by bugs which hatched from the black currant shoots. When sleeved on plums, the bugs from the apples caused a few markings but soon died. It would seem from the above that *P. rugicollis* is capable of changing its food fairly easily, as young forms whose ancestors have lived for some years on plants other than the apple are capable of feeding and living on the apple.

NOTE.—*A more detailed account of this work appears in the "Annals of Applied Biology," Vol. IV., No. 4.*

TARRED FELT "DISCS" FOR PROTECTING CABBAGES FROM THE CABBAGE-ROOT FLY.

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The cabbage-root fly (*Chortophila brassicæ*) is believed to be the worst enemy with which the grower of vegetables of the Brassica tribe has to contend. Numerous measures have been advocated for destroying the maggots of this insect, or for preventing the fly from depositing her eggs near the plants. With extremely few exceptions, none of the known remedies can be recommended as being sufficiently practical to merit adoption. In a recently-published bulletin, Gibson and Treherne record having experimented with no less than 48 different methods for combating root maggots. They conclude, however, with the statement that the only reliable protection, in the case of cabbages and cauliflowers, is afforded by the use of tarred felt "discs." Professor Goff, of Wisconsin, was the first to adopt the use of "discs" or protectors, and he found them reliable and efficient. His method is now extensively used in North America, where the "discs" have been frequently tested with satisfactory results. In the British Isles, and most other European countries, this method has hitherto failed to attract serious consideration. Reports on their use are extremely few, and they have not been subjected to adequate trials.

During the year 1916 a series of experiments was carried out under my direction, for the purpose of testing the value of this method under English conditions. A short account of these trials has already been published in this *Journal* for March, 1917. It may be recalled that the results achieved were extremely encouraging, and proved that the protected plants are, to a great extent, immune from attack. These results led me to the conclusion that the disc method of protection was a valuable one, and that efforts should be made to bring it into general use as speedily as possible, during the present food shortage. Arrangements were subsequently made in Manchester for the manufacture of the "discs" for the first time in this country. The maker undertook their production at his own cost and risk, and an adequate supply of "discs" was available to growers throughout the season of 1917. So far as it has been possible to estimate, about 300,000 "discs" were disposed of during that period, applications being received from growers resident in most parts of Great Britain. In all

cases full and accurate instructions were sent out along with the "discs." A number of the latter were also distributed gratis by my Department, and through the kind offices of Mr. J. C. F. Fryer, Entomologist to the Board of Agriculture and Fisheries. The condition was made that a report on their use was to be furnished in each instance at the close of the season. Applications were also received from the directors of the Station Entomologique de Paris, and the Ceylon Department of Agriculture, who were desirous of testing the method. In the case of Ceylon, the species of insect against which protection was required was not stated.

In 53 instances a correspondence was conducted with growers who were desirous of testing the discs, and it was hoped thereby to obtain independent opinions on their merits. In 13 cases (24 per cent.) the growers reported that the application of the discs had led to extremely successful results. In three instances, it was stated that cauliflowers had been grown satisfactorily by their use after successive years of failure. In 16 cases (30 per cent.) the "discs" were stated to be effective, and the growers in most instances expressed their intention of adopting the method the following year. In four cases (7 per cent.) the "discs" were considered of some value, but in each instance it was evident that the users thereof were not much impressed in their favour. In 17 cases (32 per cent.) the results were inconclusive, or were apparently unreliable, and only in four cases (7 per cent.) the "discs" were definitely stated to be of no value. As far as it has been possible to trace, the cases of failure or inconclusive results were due to one or other of the following causes:—(1) The "discs" were not applied the same day as the vegetables were planted out; or (2) they were disturbed by high winds; or (3) they became covered with soil after heavy rains. Various other criticisms were received, the most frequent being the trouble entailed in fixing the discs. Others complained that the "discs" did not lie flat upon the soil. In applying the "discs" to the plants it is most important to adhere to the following instructions:—

(*a*) When the young plants are planted out in their permanent quarters the soil should be in a fine, friable condition. This contributes in a large measure towards the discs lying flat and not suffering disturbance from high winds.

(*b*) It is advantageous if the soil be earthed up slightly around the plants, so as to form a flattened ridge. By this means the chances of the soil being washed on to the "discs" after heavy rains are very greatly lessened.

(c) It is very desirable that the "discs" should be applied, if possible, on the same day when the planting out is done. In warm weather the flies are especially active and are liable to attack the plants almost as soon as the transplanting is completed.

If due attention be devoted to these three points, the writer considers that there will be little cause for complaint from growers who did not achieve the success that was hoped for, when they used the "discs" for the first time. It should be borne in mind that no method of protection is perfect, and that much stronger objections can be raised against all other measures which have been advocated as a means of combating the root-fly. With a little practice, the discs can be readily fixed in position, without undue expenditure of either time or trouble. A certain amount of care is essential, but the results obtained eliminate much of the labour and expense of replacing destroyed plants.

The "discs" are now to be obtained from some of the larger seedsmen and horticulturists, while the address of the makers may be obtained on application to the writer of this article.

Diseases of Parsnips.

THE following article by Mr. A. D. Cotton, Pathological Laboratory, Royal Botanic Gardens, Kew, is reproduced, in a slightly modified and abridged form, from the *Kew Bulletin of Miscellaneous Information*, No. 1, 1918.

The attention of the Board of Agriculture and Fisheries was drawn last winter to the trouble known as "Parsnip Canker." The losses of parsnip roots through this trouble proved so serious, especially in parts of Worcestershire, that it appeared advisable to make the matter the subject of special inquiry. Two visits for this purpose were paid to Evesham and district, and considerable light on the subject has been obtained. At the same time several other minor diseases of parsnips, one apparently capable of causing severe damage, were noted. In the present paper the results of the investigations on canker are recorded. (For observations on the other diseases see *Kew Bulletin*.)

That a certain number of parsnip roots in all parts of England are annually disfigured through surface-injuries on the shoulder is common knowledge, and that in some cases serious decay

follows is also well known. In certain localities this decay, which occurs in late summer and autumn, is very prevalent, and is termed "Canker" or "Rust." The name is loosely used and the trouble not easy to define; it has apparently never been specially investigated. The brownish-coloured rot shown by affected specimens is not a characteristic symptom, but is common to other types of injury, being due largely to the oxidation of substances in the mucilage present in the parsnip root. The term "Canker" as used by growers implies a more or less open wound, at first brownish-red in colour, which affects the shoulder or upper part of the root, and frequently leads in bad cases to the destruction of the entire root (see Plate I.).

Damage in 1913 Crop.—The trouble reported from Worcestershire at first seemed to be of a more definite nature, the roots having the appearance, in certain cases at all events, of a black wet-rot. The specimens were communicated by Messrs. Yates and Sons, seed merchants and growers of Evesham, in December, 1915, and throughout the investigation Messrs. Yates have most freely given valuable help and advice. A large number of bacteria and fungi were present in the decaying roots, and in certain specimens the margins of the blackened areas were permeated almost exclusively by a fungus referable to the genus *Phoma*. The fungus was easily isolated and grew freely on various media, but was not found to agree satisfactorily with any described species of that genus. It was subsequently ascertained that this black rot was a special form of decay, and that canker was not associated with any particular fungus, but arose from a surface wound, which, invaded by various kinds of micro-organisms, led more or less rapidly to the destruction of the root-tissues.

In the Evesham district it was estimated that 10 per cent. of the entire crop was lost through canker, and this, judging from figures supplied by Messrs. Yates, would amount to a loss of 370 tons of roots from seed supplied by their Evesham branch alone. In certain fields the loss was very severe; 50 per cent. of the crop in more than one case was stated to have been rendered unsaleable.

Field Observations.—Owing to the ground being frozen during the severe weather of January and February, a visit to affected areas was postponed till the beginning of March. By this date very few sound parsnips were to be found in the field in the neighbourhood of Evesham. In the localities visited the upper part of the root just visible above the soil was almost

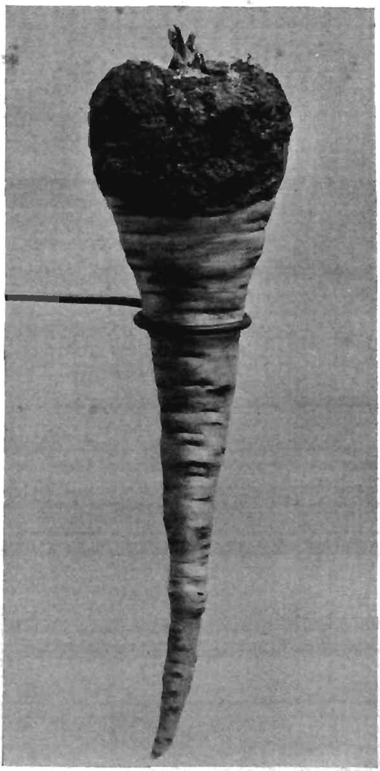

FIG. 1.—Typical example of Parsnip Canker.

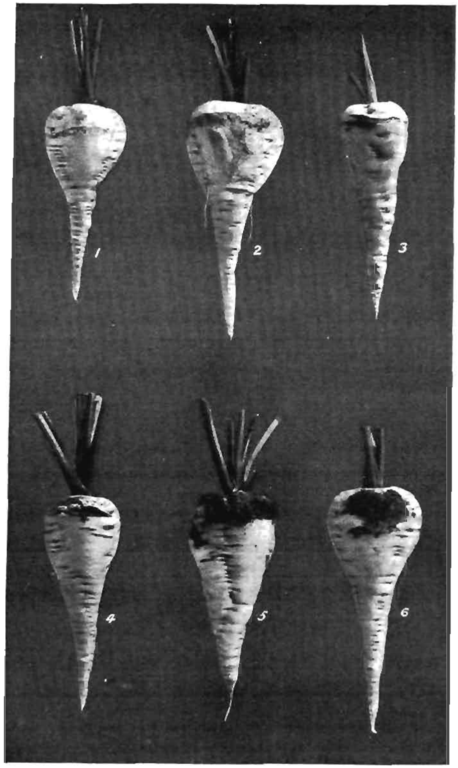

FIG. 2.—Illustrating formation of growth-cracks and subsequent development of Parsnip Canker: (1) horizontal cracking, (2) horizontal and vertical cracking; (3) commencement of decay; (4)–(6) further stages of decay and production of canker.

invariably undergoing decay through a white or grey wet-rot, largely bacterial, the initial injury in most cases be ng probably due to some other cause. No specimens of the black *Phoma* rot were seen. It was ascertained that a more or less severe form of canker occurred over a wide area around Evesham, and also in parts of Gloucestershire, whilst roots received from Somerset were almost completely destroyed through the same cause. In some cases where no rot, either wet or dry, was present a certain amount ot the so-called canker was definitely attributed to the workings of Carrot Fly, and injury by this pest was found subsequently to be very considerable (see the Board's Leaflet No. 38).

At this season it was obviously too late to obtain a general insight into the nature of canker and of the black rot. A few simple tests, with regard to soil and culture for the coming season, were therefore arranged pending further examination in September, about which date canker was said to commence. These experiments included the dressing of the soil with lime, soot and sulphate of ammonia. This was carried out by several growers near Evesham, the fields being divided into four plots, the fourth plot being left as a control. Considerable improvement was expected from the use of lime, as, judging by the abundant growth of sorrel, the soil in some fields was decidedly acid. Trials at Kew were also planned as described below.

At the beginning of September another visit was paid to Evesham. The fields of seven large growers were inspected, and also the gardens of several others where parsnips were grown on a smaller scale. By this date canker had been reported by several market gardeners, and, as was subsequently discovered, was in certain localities far advanced. It was regarded as being on the whole decidedly earlier in its appearance than in previous seasons. No destructive black rot was observed, though in advanced cases a grey wet rot had commenced. Canker was noted as being more prevalent on forked or mis-shapen roots.

The effect of the various dressings employed was first examined. To form a really true estimate it would have been necessary to lift a large number of roots and have a somewhat detailed knowledge of the character of the soil and its previous history with regard to manuring This much, however, may be said; in most fields the distribution of the canker appeared fairly uniform and to be unaffected by the dressings which had been applied. The application of sulphate of ammonia did

not apparently result in any very great increase in the growth of the parsnip or in the amount of disease. No very striking results were, however, anywhere apparent, though, on the whole, canker appeared to be distinctly worse where liming in the past had been omitted.

With regard to the physical nature of the soil and its relation to canker, in the opinion of several growers the driest lands suffer most severely. Without controverting this statement it may be mentioned that it was not corroborated during the visit. The two worst and most advanced stages of decay were found in both cases on wet heavy land (Pebworth and Sedgeberrow). A bad case was noted on light land (Fladbury). On the whole, canker appeared least prevalent on medium loam.

Animal and fungus injury were next searched for. The former was observed in some variety. The workings of the carrot fly larvae were manifest both in field and garden crops. Slug-injury was also noted, and the occasional presence of wireworms and surface caterpillars (*Agrotidae*), locally termed "leather grubs," doubtless accounted for other damage. The millipede (*Julus pulchellus*) was often abundant in the decaying parts. These animals, however, were far too few in number and too irregular in distribution to be for a moment considered as being primarily responsible for canker. Carrot fly was the most general, but it was usually sparsely distributed except in small gardens and allotments, and the characteristic tunnellings which the larvae produce, not only on the shoulder but in all parts of the outer tissue of the root, form a very definite and distinct type of injury.

Cause of Canker.—The cause of canker was more satisfactorily sought for in injuries at once noticeable in examining slightly attacked specimens—namely, the cracking of the outer skin of the root. This cracking was noted the first day, and, without ceasing to search for all indirect and subsidiary causes, was made the subject of special investigation during the remainder of the visit. The cracks were, as a rule, $\frac{1}{4}$ to 2 in. long and $\frac{1}{10}$ to $\frac{1}{2}$ in. across, and occurred either as vertical concentric slits around the top of the shoulder or ran horizontally around it at a distance of not more than about $1\frac{1}{2}$ in. below the top. Vertical cracks running down the side of the root were also present, and these appeared to be formed simultaneously with the horizontal ones to which they were, as a rule, united at their upper end. The cracks were entirely superficial, being confined to the periderm and a few layers of cortical cells.

They gaped considerably, and exposed the cortex to view as a soft, white spongy tissue.

The stages of decay from badly-cankered spots to small and sound cracks could be traced without difficulty (see Plate II.). The fresh wounds were perfectly clean (Plate II., figs. 1 and 2), but the cortical tissue within soon became attacked by animals, such as slugs and centipedes, and by various fungi and other micro-organisms. The cracks were obviously due to the expansion of the root-tissues and not to the agency of outside organisms, and were comparable to the familiar growth-cracks in carrots, but were mainly horizontal instead of vertical, and differed strikingly in being confined practically to the outer skin or rind. Subsequent observations entirely confirmed the view that canker originated from these surface lesions. That it may follow as a result of other wounds, such as carrot-fly injury, is possible and even probable, but it was obvious that a very large proportion of the trouble in Worcestershire is, primarily, due to this rupture of the periderm. The cause of crack-formation and subsequent decay of the inner tissues is discussed later.

Experiments at Kew.—Although the origin of the canker had been traced to the surface lesions described above, the organisms concerned with the actual decay had not been classified and isolated. Their distribution in the soil and their relative abundance in different localities were unknown. For this reason, the results of the soil experiments at Kew arranged the previous spring may be recorded here. Five plots of parsnips were sown in April, 1917, and were treated as follows :—

Plot A inoculated with 2 bush. of infected Evesham soil.
Plot C inoculated with cut-up diseased roots from Evesham.
Plot D inoculated with cut-up diseased roots from Somerset.
Plots B and E served as controls.

The diseased roots and soil which were obtained from Worcestershire and Somerset in March were added with a view to inoculating the soil with any organisms, parasitic, or otherwise, which might be concerned with the production of canker. The variety of parsnip sown was the same as that very largely used in Worcestershire, a broad-shouldered form of "Hollow Crown."

Preliminary examination in August and September showed the presence of many small cracks, but no marked development of canker. The plots were finally cleared on 12th November, by which date a considerable number of cankerous wounds

had developed. The results are set out in the accompanying table :—

			Per cent.
PLOT A.—Inoculated with Evesham soil (total number of plants = 96).	Sound	65	68
	Cracked	17	18
	Cankered or commencing to canker ..	14	14
PLOT B.—Control (total number of plants = 178).	Sound	103	58
	Cracked	42	23
	Cankered or commencing to canker ..	33	19
PLOT C.—Inoculated with diseased roots from Evesham (total number of plants = 76).	Sound	50	66
	Cracked	13	17
	Cankered or commencing to canker ..	13	17
PLOT D.—Inoculated with diseased roots from Somerset (total number of plants = 99).	Sound	62	63
	Cracked	22	22
	Cankered or commencing to canker ..	15	15
PLOT E.—Control (total number of plants = 168).	Sound	118	70
	Cracked	26	15
	Cankered or commencing to canker ..	24	15

From the above it will be seen that from 15–23 per cent. of the cracking occurred in all plots, and from 14–17 per cent. of canker. The figures for the latter are high, but except in plot C the canker was in an early stage, and the roots were marketable and not appreciably damaged. In plot C eight roots had badly decayed, but from the presence of equally severe injury noted in some neighbouring plots (not included in the experiment) this cannot, without further proof, be attributed to the effect of the inoculation with diseased roots. It may be due to early cracking and early commencement of decay. The experiment as a whole tends to show that inoculation with diseased material had no effect, since of the controls one (B) showed the maximum amount both of cracking and of canker, and the other (E) almost the minimum.*

In addition to the above, efforts were made by means of direct observation of roots in the Kew plots to follow the course of development of the cracks and the subsequent decay. The results were not conclusive—a fact which may be partly due to the observations being made late in the season, namely, in September, after the return from Worcestershire. Nine growth-cracks on roots in plot B were carefully examined and

* Experiments carried out by Messrs. Yates at Evesham for testing the effect of manures showed a distinctly larger percentage of canker than at Kew. The use of lime proved highly beneficial both with regard to size of roots and reduction of canker. The use of manures alone, such as Peruvian guano, sulphate of ammonia and superphosphate of lime, was not successful in mitigating the disease.

measured, the roots being left *in situ*, the soil merely scraped away for purposes of inspection, and replaced at once. The weather was somewhat dry for the first ten days after marking. After two weeks the plots were examined when but little extension of the cracks and no decay had taken place. Two weeks later, after considerable rain, a little decay had commenced and some new cracks had appeared. After another fortnight, *i.e.*, six weeks after marking, the roots were lifted and examined, with the following results :—Three slits had not increased in size and remained sound, 3 had distinctly increased in size yet remained sound, 3 had increased in size and developed cankerous wounds. Some 6 or 7 new cracks had developed, all of which remained sound.

In another set of roots on the same plot a series of shallow vertical cuts on the top of the crown resembling growth-cracks were made with a knife. Examined 6 weeks later, four remained sound and two developed into a cankerous wound.

A similar experiment was performed on plot C (infected soil) with the addition of 12 horizontal cuts on the side of the root. All these cuts, however, remained sound. It was noted that an injured surface attracted slugs, slug-injury being obvious both in growth-cracks and artificial cuts.

Summing up the Kew experiments, it may be said (1) that growth-cracks occurred at Kew as in Worcestershire, but they were decidedly smaller in size and later in developing; (2) that canker followed in a few cases as a result of these or other injuries ; and (3) that canker was found to be no more frequent in the plots inoculated with Evesham soil or with diseased roots from Evesham than in the ordinary Kew soil. The less extensive cracking may perhaps be accounted for by the small size of the roots. This was due to the seed being sown late (mid-April) and the soil being a heavy compact silt which had not been manured for two years.

Anatomical Considerations.—It is obvious to the naked eye that the cortical tissue exposed to the air as a result of cracking does not heal over. Anatomical examination shows, however, that an attempt is made on the part of the plant to protect itself, inasmuch as the outer and side walls of the exposed cells become suberised. A few cell-divisions also take place, but there is no trace of a definite phellogen or of a layer of wound-cork. This protection is quite inadequate to keep out micro-organisms, the inter-cellular spaces and cracks or fissures due to drying providing ample means of entry. The soft

parenchymatous tissues are, moreover, specially attractive to slugs, an immense amount of slug-injury being noticeable if *large gaping slits are made with a knife. It is, therefore, not* surprising that decay sets in and canker follows, and the cause may be said to be entirely due to the inability of the parsnip to form a protecting layer of wound-cork. The deep open clefts which occur in the roots of swedes, carrots, mangolds, and turnip become protected on their surfaces by a thin cork layer. No cork layer is formed when such deep cuts are made artificially in the parsnip. It would appear, therefore, that the hindrance to cork-formation is not due to the different method of cracking, but to some physiological peculiarity of the parsnip root.

The Causes of Cracking and Remedies.—The formation of growth-cracks is a phenomenon familiar enough to gardeners, and is of common occurrence not only in root crops, but in fruits, such as apple, pear, and cucumber. In the pulpy fruits of plum, cherry, and tomato a cracking of the skin is also frequent, and in this case, as in the parsnip, decay results.

Cracking is brought about by an unequal growth in the structures concerned; the *inner* tissues *grow more rapidly*, and ultimately rupture the outer layers. In the case of the pulpy fruits mentioned, cracking may be partly due to excessive turgidity of the inner cells. In either case it is, as a rule, due to the effect of an abundant supply of water at the root after a dry period, but at times it appears to be merely the result of rapid growth, when the expansion of the surface tissues does not keep pace with that of the inner. The effect of hot sun and dry conditions, especially, if there is not a copious supply of water at the root, is to ripen growth, and this entails, amongst other things, loss of elasticity in the cell-walls and decrease of the power of cell-division. Dry conditions, whether in the case of fruits or roots, are felt first at the surface, and hence surface tissues are more subject to premature ripening. If late summer rains stimulate new growth, the outer, partly ripened tissues respond more slowly, and if the pressure from within be excessive they are liable to become ruptured.

The above considerations apply to the parsnip and explain to a certain extent the cause of cracking. It is obvious that the very wet September of 1916 following the warm, dry August was conducive to late and rapid growth, which would, *for the reasons given, lead to extensive cracking of the surface* tissues of the root, and an unusual abundance of canker. In 1917 canker may have been increased by the wet August.

From information collected from various growers cracking was general in 1916 in parsnip-growing localities, though the losses elsewhere were much less serious than at Evesham. One may inquire therefore as to the presence of special conditions at Evesham, which might tend to aggravate the trouble.

On the cultural side there is evidence of several contributory factors. In order to obtain a heavy crop the seed is sown in February, at an earlier date than formerly. By this method the roots reach a large size by July and August, and there is probably a tendency to premature ripening. This theory receives support from the fact that several growers maintain that liability to canker is lessened by late sowing. The soil itself may be too rich. Though fertilisers are never applied directly to the crop, the Evesham soil is well known often to be highly manured, and given favourable weather conditions this would lead to excessively rapid growth, and consequently risk of much cracking. A highly-fed plant, moreover, would decay rapidly. In addition there is evidence, in the case of certain growers at all events, that parsnips are grown on the same land for two years in succession and that a proper rotation is not given. The effect of the latter course is not only unfavourable for parsnip growth, but tends to stock the soil to the full with the particular organisms, both animal and vegetable, concerned in their decay, and hence if cracking occurs the parsnip might be expected to be rapidly destroyed. Lastly, liming has been neglected. Experiments carried out by Messrs. Yates in 1917 show a decided improvement where lime was applied.

Yet another cause of the severity of the canker attack may lie in the nature of the variety of parsnip grown. As already mentioned breeders aim at a small core and ample flesh, an ideal well seen in the Evesham parsnip root, which is noted for its bulky, fleshy top. Such a soft mass of parenchymatous tissue would probably be easily stimulated to extensive growth after rainy periods during the summer months and to rapid expansion of the inner tissues. The breeders may have exceeded the limits in that direction and produced a parsnip particularly subject to a physiological defect. As evidence in favour of this view it may be mentioned that in allotments in Worcester, though the long slender parsnip such as "Student" showed rupturing of the rind and a certain amount of canker, these were not so extensive as in the Evesham parsnip.

Preventive Treatment.—In order to reduce the amount of surface-cracking and canker the following treatment, based on the above conclusions, may be recommended:—

1. Too rich a soil must be avoided.
2. Late sowing should be adopted. Such observations as it has been possible to make in 1917 tend to confirm growers' statements that plants from seed sown at the end of April or beginning of May suffer much less than those from seed sown in February.
3. Liming must not be neglected. As well as improving the tilth, lime acts by liberating reserves of nitrogen and potash, and its effect on the parsnip is seen in the improved quality of the crop both in size of roots and decrease in the amount of decay.
4. A dressing of salt has been found very effective by some growers. On heavy soils 5 cwt. per acre should be applied, and on light soils up to 10 cwt. per acre may be used. The salt may act by liberating a certain amount of potash from the soil, and one of the most marked effects of potash is to retard maturation and to enable the plant to continue its vegetative growth. It is possible that this effect may extend to the phellogen (rind-producing layer) and consequently render it less liable to rupture. For the same reason potash manures should prove beneficial.
5. A proper rotation should be given, and parsnips must never be grown for two years in succession on the same land.

Summary.—The canker of parsnip or the decay of the upper part of the root in late summer and autumn is a disease well known to growers, but one which has apparently never been investigated. In certain districts it has recently been on the increase and is responsible for serious losses. It is shown to be due primarily to a physiological phenomenon which causes the surface tissues to become ruptured or cracked, and not to the invasion of a fungus parasite. Decay also follows as a result of a severe injury caused by carrot fly, slugs and other animals, but in the areas investigated such injury was scarce. Cracking takes place during the growing season especially if rains follow a dry period, the portion involved being the skin, *i.e.*, the periderm and the outermost layers of the cortex. The cracks, which for the most part run horizontally around the upper part of the root but also in a vertical direction,

are from ½ to 2 in. long and gape open, exposing the soft inner tissues.

The "canker" or decay which follows is shown to be the result of the inability of the parsnip to form a layer of wound cork. Though the outer walls of the exposed cortical cell become suberised and few cell-divisions occur no definite phellogen is formed, and the growth-cracks are not protected as they are in the case of carrots, swedes, and other fleshy roots. The suberisation of the outer walls is insufficient to exclude micro-organisms, which enter, probably by means of inter-cellular spaces and fissures due to drying, and more or less rapidly destroy the tissues of the root. Though canker is worse in some localities than others it appears to occur in all districts if rupturing of the skin takes place. No one micro-organism specially connected with the decay has been isolated.

The conditions leading to crack-formation suggests that whilst such cracks are due to an unequal rate of growth, the inner tissues growing more rapidly than the outer, and are governed very largely by weather-conditions, their formation may be favoured by certain methods of culture, namely, over-manuring, neglect of liming and by early sowing (inducing premature ripening). The variety of parsnip grown may also be partly responsible, a form of high quality, with bulky top, abundant flesh, and small core, being very largely cultivated in the worst infected areas.

Control measures consist in rectifying the faulty methods of culture alluded to, and the use of potash and common salt with a view to retarding maturation.

Land Settlement of Ex-Service Men.

THE Report* for the year 1917 on the Proceedings of the Board under the Act relating to the provision of experimental Small Holding Colonies for the Land Settlement of ex-Service men states that under the Act which came into force on 23rd August, 1916, the Board have now either acquired or agreed to acquire all the land which they are authorised to hold under the Act (6,000 acres in all), and the selection of sites for the Colonies involved a very considerable amount of work. A number of estates were inspected by the Board's officers and

* Annual Report of Proceedings under the Small Holding Colonies Act, 1916, for the year 1917: *Board of Agriculture and Fisheries.*

reported upon as being unsuitable for various reasons; and those finally selected have only been acquired after careful consideration of all the factors likely to affect the success of the Colonies, including soil and situation, cost of equipment, proximity to markets and the prospect of financial return. In this connection, it may be pointed out that, under existing financial conditions, the Board have been considerably handicapped by the difficulty of establishing experimental colonies upon a sound economic basis, as not only is the cost of building some 70 per cent. in excess of pre-war cost, but the rate of interest for loans for small holding purposes now stands at $5\frac{1}{2}$ per cent., and it seems probable that any schemes which may be initiated within the next few years for the provision of Small Holding Colonies must be subject to the operation of these drawbacks.

Tenure.—The Departmental Committee on Land Settlement for Soldiers and Sailors considered (Part I. of their Final Report, page 8, paragraph 26), that, as a general rule, it would be necessary that land acquired for Farm Colonies should be purchased, but that if land could be acquired on long lease on satisfactory terms, advantage should be taken of such facilities, owing to the great reduction which would be effected in the capital cost incurred in establishing the settlements. In acquiring land for their Colonies, the Board have proceeded in accordance with the views of the Committee, and they have taken two estates in England on long lease from the Crown. It has been found necessary, however, to purchase the land for the third English Colony and also that for the Welsh Colony.

Estates Acquired.—(i.) *Patrington Crown Colony.*—The first estate was acquired by the Board in the autumn of 1916, and it comprises an area of 2,363 acres, situated near Patrington in the East Riding of Yorkshire, about 15 miles from Hull. This land has been hired from the Crown on a lease for 99 years at a rental of £3,277 per annum, and it was originally intended for a Colony of the mixed farming type on which the average size of the holdings would be about 35 acres. The Board have since decided, with Treasury sanction, in the interest of the settlers, that this estate shall be worked for a time on a profit-sharing basis, instead of being divided up at once into small holdings, as it seems probable that the land can be worked to greater advantage on that basis until it has been ascertained, by practical experience, to what extent the heavy warp land is adapted for the intensive crops required on small holdings.

Possession of this estate was obtained on 6th April, 1917, and Mr. R. N. Dowling, formerly Agricultural Organiser to the Lindsey County Council, was appointed Director of the Colony on the 1st January, 1917, and, after the necessary preliminary work, took up his residence at Patrington on the 9th May, 1917. The estate is being farmed as a whole, and, as but few prospective settlers have arrived at the Colony, the Director has to depend mainly on local labour for cultivating the land, and on the services of soldiers temporarily released from the Army. It is anticipated, however, that about 60 settlers will be placed eventually on the property.

As regards equipment, 22 pairs of cottages are in course of erection by the Housing Organisation Society, who were appointed to act as agents on behalf of the Board. About 15 pairs of cottages have been completed, leaving 8 pairs still to be erected. In addition, various alterations and repairs to the existing buildings have been effected by the Society.

(ii.) *Crown Estate, Holbeach Marsh.*—The Board have also acquired from the Crown on a lease of 99 years, 1,000 acres of land on the Crown Estate, Holbeach Marsh, in the Holland Division of Lincolnshire, at a rental of £1,623 per annum.

This estate is intended for the market-gardening type of Colony, for which it is well adapted, both in respect of soil and situation. It is proposed to divide the land into holdings of about 10 acres. Suitable cottages and buildings are being provided for each holding, and the Colony should accommodate about 80 settlers. Only two holdings have so far been taken up, otherwise the estate is being farmed as a whole.

Possession of this estate was obtained on 11th October last, but by arrangement with the quitting tenants, building operations were commenced at the end of April, 1917. In this case, the contract for the erection of the cottages was put out to competitive tender.

(iii.) *Heath Hill Estate (Salop).*—This property comprises about 1,150 acres and formed part of the Duke of Sutherland's Lilleshall Estate; it has recently been purchased by the Board for the sum of £40,000. It is estimated that this land will provide for the requirements of some 40 small holders, and that the hold ngs will be of the dairying and market gardening type. The Board were to obtain possession of the estate at Lady Day, 1918, and plans for its development have not yet been completed.

It is proposed to appoint as Director of the Colony Mr. Henry Henshaw, who was for 10 years, 1900-1910, Manager of

the Cambridge University Experimental Farm, and has since 1915 filled the post of Agricultural Adviser and Pedigree Live Stock Agent to Messrs. Chivers and Sons, Limited, of Histon, Cambs.

(iv.) *Pembrey, Carmarthen.*—After consultation with a Committee appointed by the Welsh Agricultural Council, the Board have agreed, subject to the completion of a formal contract, to purchase an estate of 1,345 acres at Pembrey for the sum of £30,000 from Lord Ashburnham, as a site for the Welsh Colony. This Colony, possession of which is expected to be obtained at Michaelmas next, will probably provide for about 60 settlers.

Selection of Applicants.—A considerable degree of misconception has been found to exist in regard to the scope of the schemes which the Board are called upon to administer under the Act, and it may be desirable to point out that, while the Board hope to be able to find employment for a certain number of disabled men, yet the latter can form only a very small proportion of the ultimate settlers, as the Colonies were not intended to make provision for disabled men as such, but to ascertain by actual experiment how far small holdings grouped on the Colony system on the lines recommended in the Report of the Departmental Committee can be successfully organised. The claims of disabled men will always receive sympathetic consideration, but the first consideration in the selection of applicants must be their prospective capacity for earning a living on the land.

The Board have prepared a special form of application, which is sent out to applicants. On the return of the completed application form it is registered, and the Board arrange to interview the applicants at some convenient centre with a view to ascertaining their suitability for becoming small holders. In cases where applicants are required to make a journey for the purpose, the Board have been authorised by the Treasury to pay 3rd-class railway fare.

Where the applicants seem likely to prove suitable and have received their discharge from the Army, arrangements are made for them to commence work at an early date on one of the Colonies for which they have indicated a preference. As a rule an applicant, after acceptance, will be required to work for wages on the Colony for a year before he is finally accepted and allotted a holding.

Advance of Capital.—Inquiries are frequently made by applicants as to whether advances of capital are made by the State to enable them to take up holdings under the scheme; but the

Board have no power to make advances for the purpose, and the suggestion was expressly negatived by the Departmental Committee on Land Settlement for Soldiers and Sailors, who found themselves unable to recommend such a proposal, to which they felt there were serious objections.

It is satisfactory, however, to note that a considerable number of applicants possess a certain amount of capital, which in some cases may be regarded as being adequate. Out of 178 cases dealt with by the Board it was found that while 54 applicants possessed capital of not more than £50, 42 had from £50 to £100, 26 from £100 to £200, 13 from £200 to £400, while 43 (or less than one-fourth) possessed practically no capital at all.

A certain number of applicants have indicated their desire to purchase holdings on the Colonies. This is obviously impossible where, as at Patrington and Holbeach the Board hold the land on lease; but where the Board own the freehold of the estate, they have power, subject to Treasury sanction, and subject also to the provisions of Section 12 of the Small Holdings and Allotments Act, 1908, to dispose of it to the occupiers, who may pay for it by periodical instalments spread over a term of years.

Cottage Accommodation.—With regard to the erection of cottages, as to which many enquiries have been received, it is intended that they should be built on or near to the land which is to be occupied with them, and, for the sake of economy, the cottages are being built to one plan; but the outbuildings have not yet been commenced, as it is anticipated that many of the military hutments may be utilised for the purpose, and a considerable saving thereby effected in the rent that will have to be charged to the tenants.

Type of Colonies.—It was originally the intention of the Board to establish Colonies devoted to fruit and market gardening, dairying and mixed farming respectively, and to cut up the estates acquired into small holdings as soon as applicants possessed of the necessary capital and experience were forthcoming, but the Board have since had reason to modify their plans and they have decided (subject to Treasury sanction) that the Patrington Colony, at any rate, shall be worked for a time as one farm, on a profit-sharing basis. Subject to this reservation, the Board have kept in mind the desirability of establishing Colonies of the three types referred to.

Notes on Feeding Stuffs for May: *From the Animal Nutrition Institute, Cambridge University.*

MARKET reports show no sign of any increase in the supplies of feeding stuffs in general, but there are indications that a few articles are reaching the markets in rather larger quantities. American linseed cake, Egyptian cotton cake, maize gluten feed, Chinese beans and millers' offals are among these articles and appear to be fairly plentiful, especially in the west of England.

As regards prices, readers should study the Cattle Feeding Stuffs (Maximum Prices) Order of 7th February, 1918, which was reprinted in the last number of this *Journal*, p. 1474. This Order fixes the price of practically every kind of concentrated feeding stuff.

The Rationing of Live Stock Order which, it is understood, the Ministry of Food are about to issue, has not yet* appeared, but advance Press notices of the Order indicate that the system of Priority Orders, which has been at work for some time for milch cows, is now being extended to certain other classes of livestock, namely, horses maintained and used for agricultural purposes only, calves under six months old, breeding sows, store pigs, and milch goats. Anyone possessing animals of any of these classes can now obtain a Priority Order, which will entitle him to buy feeding stuffs in strictly rationed quantities.

To obtain such an Order, application should be made to the Area Live Stock Commissioner for the district. A list of the names and addresses of the Area Live Stock Commissioners appeared on p. 1471 of the March issue of this *Journal*.

Although the Priority Order entitles the holder to buy feeding stuffs up to a certain limit, it does not always ensure that a sufficient supply of the desired foodstuffs will be available. Holders of Orders may have to be content with feeding stuffs of some other kind than the kind ordered. It may even happen that it is impossible to purchase the requisite amount of feeding stuff of any kind. In this case holders of Priority Orders should apply to the Secretary of the Feeding Stuffs Committee, whose address can be obtained by application to the Area Live Stock Commissioner.

The attention of livestock owners is drawn to the serious shortage of coarse fodders, and it is hoped that all feeders will exercise the strictest economy with reference to the hay and straw in their possession. As feeders are doubtless aware, most stacks of hay and straw are ear-marked for Army purposes.

* April 18th.

Arrangements have been made, however, for the release for civilian use of such supplies of hay and straw as are not required by the Army, and trade nominees have been appointed to deal with these supplies. Any one requiring hay or straw should write to the District Purchasing Officer of Supplies for his county, who will doubtless put him in touch with the trade nominees who have supplies available.

Such supplies, however, are primarily intended for town and urban district requirements, since all farmers are allowed to retain such of their hay and straw as they require for their own stock. It cannot be too strongly urged that farmers should estimate their requirements accurately, in order to prevent any possible shortage occurring with regard to their own supplies, as it may prove almost impossible to replace at short notice any deficiency in this respect.

Horses.—According to the advance Press notices of the Rationing of Live Stock Order, owners of horses maintained and used for agricultural purposes may obtain Priority Orders, which will entitle them to buy enough concentrated feeding stuffs to provide, with their own home-grown foods, a ration of 10 lb. per day per horse. This ration is a maximum one and it should be possible to save on it as soon as the grass comes. Every owner of horses should take steps to ensure that his men do not exceed the ration.

Milking Cows.—The working of Priority Certificates for milking cows is now well understood. During this month, cows generally will be turned out to grass, and it should not be necessary to give them any concentrated food, except, perhaps, a small allowance of some astringent food, such as cotton cake, to prevent them scouring for the first week or so until they get used to a grass diet.

Other Cattle and Sheep.—Except in the case of young calves, for which a Priority Order for ½ lb. per head per day of concentrated food may be obtained, no food should be required except grass.

Pigs.—The feeding of pigs was fully discussed in last month's notes. Since then, according to the Press notice issued by the Ministry of Food, pig keepers are entitled to Priority Orders for breeding sows at the rate of 4 lb. of meal per day, and for store pigs at the rate of 1½ lb. per day. These amounts will, of course, not suffice for fattening, but they should enable pig keepers to produce large quantities of strong store pigs suitable for feeding on grass and other green stuff or refuse materials of various kinds.

The Ministry of Food have also announced in the Press that young pigs may be sold as stores up to 80 lb. live weight; that is to say, at market price and not by live weight. The Ministry have further stated that no pig may be sold for slaughter weighing less than 112 lb. live weight and that the price of pigs for slaughter has been substantially increased. In addition, the President of the Board of Agriculture has appointed a Director of Pig Production, from whom full information may be obtained as to methods of feeding pigs in war time.

Notes on Manures for May:
From the Rothamsted Experimental Station, Harpenden, Herts.

Dependence on Home Supplies of Manure.—Owing to the exigencies of the War farmers may be thrown more and more on their own resources for fertilising the land, and all possible care should be taken of home supplies of manure, which are really considerable in amount, though they have been somewhat neglected in the past in consequence of the great supplies of artificial manures available. The farmer is now in a somewhat similar position to that of his predecessor in the 'forties and 'fifties of the last century, who had to farm, and did farm, without drawing supplies from all over the world, and who had none of the good implements and organisation of modern times to help him.

Avoid all Waste of Farmyard Manure.—The greatest possible care must be taken of farmyard manure, and especially of the urine, which is its most valuable constituent. On no account should any liquid manure be allowed to run to waste; the urine should be completely absorbed by litter, and if there is not enough straw available, bracken or some other substitute should be used.

The manure should not be exposed much to rain; black liquid running away from a manure heap is a sure sign of wastage. The liquid itself might be collected, but this would not completely repair the damage because the loss brought about by rain is only partially due to drainage; the more serious part is not shown in this way.

As far as possible summer storage of manure should be avoided, as it is during this period that the greatest losses arise. In peace time a certain amount of summer storage was inevitable, because on some farms the acreage under roots and

potatoes was insufficient to absorb all the manure produced. The Rothamsted experiments show that none of the methods at present in use can be relied upon to prevent loss in summer. Compacting the heap is satisfactory in winter and in the early days of warm weather because it delays the setting in of the decomposition processes, but it affords no lasting protection against them, and once they start in summer they go as far in the compact heap as in the loose heap. In two of the trial heaps of bullock manure kept over the summer at Rothamsted the losses were :—

	Compact Heap. *Per cent.*		*Loose Heap.* *Per cent.*
Of Dry Matter..	47·5	....	45
Of Nitrogen	42	....	32

The proper way of avoiding the loss is to have a sufficient acreage of roots and potatoes to take the whole of the manure available till the end of the spring, so as to leave only the daily production to accumulate during the summer.

Composts.—Farmers might well turn their attention to the possibilities of making compost heaps. The art was well known to agriculturists during the 'fifties and 'sixties of the past century, and in the old days, before large quantities of artificial fertilisers were available, farmers and gardeners made great use of composts. Indeed, in the *Gardeners' Chronicle* for 1845, Mr. Errington describes no fewer than 20 different composts for garden purposes, and explains their uses. He attributes some of the most marked of the then recent advances in horticulture to a better understanding of the use of composts.

Mr. Hannam, of Kirk Deighton, Wetherby, writing in Morton's *Cyclopædia of Agriculture* in 1855, describes the best method known to him of making composts on the farm. He describes three kinds—Farmyard Manure composts, Lime composts and Earth composts. *The Farmyard Manure composts* are made by mixing sods, turf, leaves, heath, moss, rushes, weeds, clippings, etc. (but not animal refuse), with farmyard manure in alternate layers each about 1 ft. in thickness, and covering the whole with a coating of earth. After the mass had undergone considerable decomposition it was turned and roughly mixed, and a covering of ashes, charcoal or earth again spread over it. Liquid manure was also added with advantage.

Lime composts were made by mixing lime with peat, sawdust, bark, roots of couch grass, hedge clippings, ditch scourings,

road scrapings, weeds from fallows, sods, etc., the mixture being as uniform as possible. The heap was turned two or three times before use, and was ready in two or three months.

Earth composts were made by mixing soil with animal matter, waste fish, blubber, wool waste, shoddy, etc., and treating the heap as before. The resulting fine earth was drilled with the seed so that the young plant started in the artificial soil. The results obtained from a well-made compost were said to be as good as from farmyard manure.

Manuring of Barley.—When barley is grown after roots fed off it is often improved by 2 cwt. of superphosphate per acre. If no cake has been fed, or if the roots have been drawn off, a nitrogenous dressing will be needed, such as ¾ cwt. of sulphate of ammonia or 3 cwt. of rape cake. There is no substantial evidence for supposing that a nitrogenous dressing in this amount injures the *quality*; season is far more potent than manuring in this direction. In the Yorkshire experiments 1 cwt. of sulphate of ammonia gave an additional 5 bush. of grain, while the phosphate gave an additional 2 bush.

If the land has been well sheeped prior to barley, the phosphatic dressing may be increased, and on light soils 2 cwt. of salt may sometimes be applied with advantage, especially if "seeds" are to be sown in the barley; salt and phosphates both help to keep the crop standing up and thus avoid "lodging" and consequent smothering of the young plants of the clover mixture. Salt does not always act well, however; it proved ineffective in the Norfolk experiments.

Manuring of Flax.—Flax may be grown primarily for the sake of the fibre as in Ireland, or for the seed as in certain parts of England, and the manurial treatment differs according to the purpose in view.

For Fibre Production.—An extended series of experiments has been made in Ireland, especially in the north, where a considerable quantity of flax is grown. These show the great value of potassic fertilisers, kainit and muriate on the whole proving better than sulphate. In some seasons a dressing of nitrogenous fertiliser—rape meal or sulphate of ammonia—was advantageous, but not always. Phosphates encouraged the weeds more than the flax, and therefore are not recommended. Pending further investigations the Irish Department recommend the following dressing for fibre production: 5 cwt. of kainit or 1½ cwt. of muriate of potash per acre, or their equivalents, applied during winter, or at the time of sowing.

Seed Production.—For seed production, on the other hand, there is no evidence of any special need for potash, nor of any harm done by phosphates—indeed, rather the contrary. Generally speaking a farmer would probably be safe in treating flax grown for seed as he would treat barley.

Treatment of Grass Land.—In view of the shortage of fertilisers it may not be possible for farmers to use as much on their grass land as they would like. It may be pointed out, however, that considerable increases in grass crops, both on pasture and on hay land, can be obtained by suitable cultivations, especially by going over the grass early in the year with a toothed harrow so as to break up the surface and allow better aeration of the roots. On pasture land a good deal can be done by collecting and spreading the fæces as is done in Northamptonshire; this not only tends to keep the herbage nniform by preventing excessive accumulations of nitrogenous manure near hedges, gates, etc., but it reduces the loss which inevitably occurs as soon as large amounts of fæces are assembled together. Any slag that can be obtained, even of low grade, should be put on.

Waste Lime Products.—Further satisfactory samples of waste lime products continue to be sent to the Food Production Department. One of the latest is from the Forest of Dean, and this ought to be of considerable local interest in view of the fact that many of the soils of the district need lime.

The Cultivation of Buckwheat.

THE object of this article is to direct attention to the value of buckwheat as an auxiliary grain-crop, peculiarly suited to the circumstances of the present time.

Advantages of the Crop.—Although strictly not a cereal, buckwheat closely resembles the cereals in composition, and may be largely used to replace these for general feeding purposes.

It will grow on sandy, gravelly soils which are too precarious for other crops, and its cultivation is simple and inexpensive.

It requires only from 12 to 14 weeks to mature and can therefore be sown late; indeed, to avoid damage by frost, to which it is very liable, it should not be sown before the middle of May, and the end of June is not too late in a favourable year. It can, therefore, take the place of crops which have failed or which could not be sown in due season.

It has been grown with success on land which would ordinarily have been bare-fallowed, and for this reason is specially to be recommended at the present time; it is an excellent smother crop, and leaves the land in fine, friable condition for autumn corn or other crops.

Though it is a seed-bearing crop it belongs to an order of plants which differ in soil and food requirements from the cereals, and it may, therefore, follow or precede these without injury to either crop.

Varieties.—There are three main varieties in cultivation, but the common type (*Polygonum Fagopyrum*, L.) is the only one in general use.

Soil and Climate.—The crop will thrive on a wide range of soils, but is best suited to warm, well-drained sandy loams. On the richer classes of soils, such as those of the Fen districts, it grows luxuriantly, but it cannot, from an economic point of view, compete with the cereals under such conditions, and only when such crops have failed or cannot be sown should buckwheat take their place. Its special value as a grain producer lies in the fact that it will produce an appreciable crop on the poorest natural description of soils, or on other light soils, which have been allowed to sink into poor condition, but on cold, wet lands it is not very reliable. The plant is very sensitive to low temperatures and may be destroyed in a single night of frost, whether at the beginning or end of its period of growth.

It is chiefly cultivated in the Fen districts of Norfolk and Cambridge, and on the poor, thin soils found in East Anglia.

Preparation of the Land.—No great amount of preparation is required. But the finer the tilth, the better will be the results, as the roots spread chiefly in the surface soil, and are not capable of dealing with hard clods. On the lighter soils a single ploughing, followed by harrowing and rolling, is generally all that is required.

Manures are rarely applied directly to buckwheat; what remains from previous applications is generally sufficient. On poor, sandy soil, however, farmyard manure, if available, may be applied together with a dressing of superphosphate.

Sowing the Seed.—The seed should not be sown until the end of May or beginning of June. It should be of good weight (about 50 lb. per bush.) and of good germinating power. The seed may be drilled in the same way as corn at the rate of

about 2 bush. per acre, but many farmers prefer to sow in rows, 14 in. apart; in this case from 1 to 1½ bush. per acre are sufficient. For sowing broad-cast, up to 3 bush. per acre will be required.

As little moisture is necessary for germination, it is a mistake to bury the seed too deeply, ½ in. to ¾ in. being sufficient. Provided that the land has been well cleaned before sowing, no further cultivation will be required.

Harvesting.—Ripeness is indicated by the general browning of the crop, but even then flowers, a succession of which is produced right into late autumn, will be noticeable on some of the branches. The best time to cut, therefore, is when the majority of the seeds are formed and before the earliest have fallen.

The crop is harvested in various ways, but the usual method is to cut with a scythe or reaper and leave to dry for a few days before tying up and shocking with the weathered side inmost. The preliminary drying before "shocking" is necessary on account of the sappy nature of the straw.

After thorough "winning" in the field the crop is carted and stacked. In stacking it is usual to make the stacks quite small and to put in here and there a layer of wheat-straw to take up the surplus moisture.

Yield.—The yield of grain varies greatly, the average being about 3 qr. per acre; on poor soils in bad seasons it may be less, while on richer land in a good year it may amount to 6 qr. per acre.

The weight per qr. as sold in the local markets is 28 stones (392 lb.)

Uses of Buckwheat.—(1) *Grain.*—In many parts of the Continent buckwheat bread still forms the staple diet of the poorer classes, while in the United States large quantities are used for human food, in the form of buckwheat groats, etc. The buckwheat is ground and the outer black hull separated.

In this country the crop is grown chiefly for the purpose of feeding game and poultry. As a feeding stuff, the buckwheat grain is characterised by a somewhat high fibre content, otherwise it is roughly intermediate in composition between barley and oats.

Analyses.

	Water.	*Albuminoids.*	*Fat.*	*Carbohydrates.*	*Fibre.*
Buckwheat	13	11	2	60	12
Barley	14	10	2	67	5
Oats	13	12	6	55	10

When cracked or ground and mixed in small quantity with other foods, buckwheat may be fed with good results to horses, cows or pigs.

(2) *Straw*.—Buckwheat straw is seldom used for feeding purposes, but on occasions when other fodder is scarce, it may be chopped and mixed with other material and fed to cattle and sheep with advantage. As litter the straw does not last well, but it makes good bedding for cows. As it is rich in mineral matter and rots quickly, it also makes good manure.

This article is also issued separately as Food Production Leaflet No. 42.

Jerusalem Artichokes.

THE attention of allotment-holders, gardeners and small cultivators generally was last month drawn by the Food Production Department to the value of the Jerusalem artichoke, both for purposes of human food and for feeding to pigs.

Recent investigations by the Royal Society Food (War) Committee show that when eaten in moderation the artichoke is an excellent human food, and that its food value, as measured in calories, is superior to that of the potato. The composition of artichokes and of potatoes is as follows :—

	Water.	*Proteins.*	*Total Carbohydrates.*	*Calories Per lb.*
Artichokes ..	79·5 ..	2·6 ..	16·7 ..	365
Potatoes ..	75·5 ..	1·8 ..	14·7 ..	310

The artichoke, moreover, yields large crops. An average yield from field cultivation is about 10 to 12 tons, but in gardens and allotments when the soil is rich it should be considerably higher. Estimates of yield obtained by the Royal Society Food (War) Committee give figures as high as 20 tons per acre on garden ground.

Other advantages possessed by the Jerusalem artichoke are that it is not subject to disease, and will grow in almost any soil and situation provided that there is an abundance of light and air. It succeeds best on a deep, friable, sandy loam.

For planting, medium-sized tubers should be chosen, or larger tubers may be cut into pieces each with two or three eyes. The white tubered varieties are generally preferred to the pink as they are of a better shape.

In the south, planting should be done during March or the beginning of April, but in late districts and in the north

planting may be continued until the end of April. The tubers may be planted in shallow trenches or dibbled 4 to 5 in. deep in soil which has been well worked. The usual distances at which to plant are 3 ft. between the rows and 1 to 1½ ft. between the sets. The planting should be closer in poor soils and wider in rich soils. 14 lb. of tubers will plant a rod of ground.

The only cultivation necessary is hoeing to keep down the weeds and the drawing of a little earth to the stem. The surface of the soil should be stirred during dry weather.

The tubers do not suffer from frosts and may be left in the ground and lifted as required; or, to get over the difficulty of digging the tubers in frosty weather, they may be lifted in November and stored in sand in a cold shed or cellar, or they may be clamped in the open like potatoes. They should not be exposed freely to the air, or they become soft very quickly.

The fork should be used in lifting and care should be taken to remove all the tubers, otherwise they will grow in the following year.

For use as pig food, artichokes should be cooked when fed to small pigs, but sows will take them raw. Under field cultivation and after the crop has been lifted pigs turned into the field will clean the ground by picking up the small tubers left in digging, and a further advantage of thus turning in pigs will be the increased fertility of the ground.

Notes on Allotments.

New Allotments.—Up to 30th March, 1918, 251,474 new allotment plots had been arranged for under the Cultivation of Lands Order by local authorities acting in co-operation with the Food Production Department. The Department also report that, in consultation with twenty-six local authorities arrangements were made in the week ending 30th March for the laying-out of 6,183 additional allotments, covering an area of 401½ acres. Parts of the Royal Parks in London are also to be cut into allotments, some 5 acres of land in Kensington Gardens having been set apart for this purpose by the Office of Works.

Allotment Rivalry.—Especially in the North Country there is keen rivalry among local authorities as to which shall supply the largest number of allotments per 100 inhabitants. In

Yorkshire some of the councils are trying to get an allotment for every three inhabited houses if possible. Amongst other townships that have accomplished this are Keighley and Ossett; indeed, more than half the householders in these places have allotments. The task of the bigger towns is more difficult, of course, but Leeds has one allotment for every thirteen houses and Bradford one for every ten. In Yorkshire alone about 1,600 acres of land are being taken over for allotments by local authorities.

Crops to Grow.—There are two distinct directions in which an allotment holder may aim. Firstly, to obtain a supply all the year round for home consumption, in which case probably one-half of his ground will be taken up by potatoes, and the remainder largely devoted to the most essential vegetables; or, secondly, to produce entirely or partly for market, which would necessitate larger areas being devoted to say three or four varieties of vegetables so as to permit selling in quantity. The first object will be that commonly pursued; and, working on these lines, it is advisable to prepare a rough plan of the ground, marking out the crops for two or three years, so as to secure a proper rotation and to calculate one's seed requirements.

Be sure to get the best seeds available, for this invariably proves to be the most economical system in the end.

The principal aim will be to grow as much as possible of those vegetables which have the highest food, or dietetic, value; and the following are among such vegetables: potatoes, onions, leeks, parsnips, Jerusalem artichokes, broad and haricot beans, celery, and beetroot, for general use; Brussels sprouts, kales and savoys for winter and spring supplies of green vegetables; and pumpkins for winter storing.

There is also a secondary matter to bear in mind; this is that owing to the prospect of very diminished supplies of food of fine flavour, such as cheese, butter, fish, meat, etc., seasoning vegetables such as shallots, lettuce, chives, radish, endive, ridge cucumbers, mustard and cress, chicory, garlic, etc., may well be grown, where possible, in addition to savoury herbs, such as parsley, mint, thyme, sage, etc. These all assist in making tasty dishes and salads, thereby helping to economise the use of meat, fats, and other scarce foods.

Where it can be done, tomatoes should be grown also with this object in view.

The question of varieties to be grown is very important, and local experience only can teach which are best for the allotment holder. In some places a certain kind will do remarkably well, whereas in another district it may prove a very poor sort to grow. The would-be cultivator should select when possible those which are known to succeed in his locality.

At the time of sowing seeds, steps should be taken to combat the attacks of birds, pests, etc., by wire-covers, string-nets, or cotton strands and by sprinkling of soot and lime between the rows.

Fertiliser Prices.—In reply to inquiries, the Food Production Department states that the South Metropolitan Gas Company and various other concerns are now making up 7-lb. packages of sulphate of ammonia for sale at 1*s.* 6*d.* to allotment holders. Most of the retailers of fertilisers should be in a position to supply sulphate of ammonia approximately at this price. The March price for superphosphate is about 8*s.* 9*d.* per cwt. in London. Secretaries of gardening, allotment, small holdings, and similar societies can obtain lists of fertiliser firms from the Food Production Department, 72, Victoria Street, S.W. 1.

Structures on Allotments.—In some parts of the country certain persons are objecting to the erection of "unsightly structures" on allotment plots and have attempted to get local authorities to prohibit their erection. The Food Production Department has no sympathy with such sensitive people, and *that where it is more convenient that workmen should have tool* sheds on allotments, instead of carrying their tools backwards and forwards for long distances, the Department trusts that local authorities will do nothing to prevent the most efficient cultivation of allotment plots. The example of authorities in the North Riding of Yorkshire may well be followed where this difficulty arises, the local allotment association being asked to undertake the supervision of the erection of any tool sheds or other structures on the allotment ground.

Steam Tackle Achievements.

THE work of the tractor on the land has naturally excited a great deal of popular interest and appreciation because of the novelty of the machine and its increasingly successful results. It is pointed out by the Food Production Department that a great deal of the credit for the advanced state of the agricultural programme is due to the older form of mechanism, known as the steam plough or steam tackle, and in our enthusiasm for the tractor we ought not to forget the debt due by the Nation to the steam-plough owners of the country.

In March, 1917, Sir Arthur Lee asked Mr. John Allen, the Chairman of the Steam Cultivation Development Association, to organise the steam-ploughing industry in England. At that time, owing to difficulties in procuring labour and material, a considerable number of ploughing tackles were not being worked. The Food Production Department immediately took steps to secure the return from the Army of a large number of skilled steam-ploughmen and also rendered assistance to the trade in other practical ways, bringing home to the steam-plough owners the national importance of the industry. The steam-plough owners promptly responded with an increased acreage of 40 per cent. The Department also took steps to procure a considerable number of new tackles, some of which are already at work. The tackles are not owned by the Food Production Department or the County Committees; they are all privately owned, principally by contractors, who plough by the acre.

It was considered that the best results could be obtained by allowing the steam ploughs to remain in the hands of their owners working under the direction and organisation of the Food Production Department, with the result that they have ploughed or cultivated during 1917 close upon 1,000,000 acres. The precise figure is just over 990,000 acres, to which can be added 80,000 acres since 1st January, 1918, making a total of 1,070,000 acres for the coming harvest. Thanks are due to the trade for keeping a considerable portion of their tackle at work throughout the winter, notwithstanding the fact that owning to short days and unsuitable weather the work was unremunerative.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders mentioned below may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester; and 1, St. Andrew's Crescent, Cardiff.

THE following Circular Letter (No. 89/M. 6), dated the 11th March, 1918, was addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Organisation of Threshing.

SIR,—With reference to the Department's Circular Letter of the 27th February and previous correspondence respecting the organisation of threshing, I am directed to inform you that the Department have given further consideration to the arrangements which should be made for threshing the 1918 crop. They have come to the conclusion that there is no possibility of increasing substantially the threshing resources of the country by supplying large quantities of new tackle, and that the only means for arranging for the threshing of the increased corn crop which is expected to be harvested this year will be by improving the organisation of the existing resources. To carry this out efficiently the threshing industry must be organised on a county basis.

In a few counties steps have already been taken by Executive Committees to organise the industry in their area. The Department do not suggest that in such cases the scheme which has been adopted should be modified, provided that the Committee satisfy themselves that the arrangements made will be adequate to the needs of their area.

In other cases the Department urge Committees to give immediate consideration of the following scheme. It is not proposed to lay down hard-and-fast rules, but to outline proposals which your Committee should adopt to the needs of their area:—

Threshing Sub-Committee.—A Sub-Committee should be constituted to deal specially with threshing. The Sub-Committee should consist of two representatives of the threshing trade, with a member of the Executive Committee and a member of the Machinery Committee. With a view to the selection of representatives of the trade it may be necessary, in the first instance, for your Committee to call a meeting of the threshing contractors in the county. The local Forage Officer should also be invited to attend the meetings of the Threshing Sub-Committee in an advisory capacity. The Department understand that the War Office will be prepared to give him permission to do so.

The principal duty of the Threshing Sub-Committees will be to arrange that the tackle in the county is put into an efficient state of repair, provided with labour, and worked to the best national advantage. To ensure that existing tackle is fully utilised it will be necessary for the Sub-Committee to divide the county up into areas and allocate to each area sufficient sets to cope with the expected crop. This arrangement will only be brought into effect by the Sub-Committee co-operating with the trade, but from enquiries which the Department have made it is clear that the threshing industry are quite prepared to fall in with any well-considered scheme. In the event, however, of an individual owner unreasonably refusing to adhere to a scheme approved generally by the trade in the county, the Department will not hesitate to authorise the Executive Committee to commandeer his tackle so as to enable it to be operated by other contractors.

Labour.—The Sub-Committee will probably find that one of the principal reasons for threshing sets not being worked to their maximum capacity is the shortage of skilled men. To overcome this difficulty the Department will authorise the Sub-Committee to lend to contractors for the remainder of the present threshing season any surplus men who have been trained for tractor work. During the time they are under training with the threshing contractors the Tractor Representative will be instructed to pay their wages. At the end of the threshing season these men must return to the Tractor Representative until they are required for threshing the 1918 crop, when they will have to be paid by the threshing contractor. It is hoped that the Sub-Committee will be able to arrange by this means for an adequate supply of labour to be trained ready for next autumn.

Additional Supply of Threshing Machinery.—The Department will be prepared on the recommendation of the Sub-Committee to release, so far as the supply is available, threshing boxes now being manufactured to their order, to any of the owners who are working in association with your Sub-Committee. The supply, however, will not be great, and the Sub-Committee should endeavour to arrange for threshing boxes owned by farmers and landowners in the county to be loaned to contractors so as to be available for work throughout the district.

With regard to engines the Sub-Committee, in consultation with the local Forage Officer, will have to consider the date at which engines in the county under contract with the Forage Committee should be returned to their owners for threshing work; also to what extent tractors may be substituted for engines now employed by the Forage Committee for hauling.

The Department desire to press upon your Committee the urgent necessity of inaugurating a scheme on the above lines if any effective steps are to be taken to train additional men during the few weeks which remain of the present threshing season.

I am, etc.,

(Signed) H. L. FRENCH,
General Secretary.

THE following Notice has been issued by the Ministry of Munitions of War, 8, Northumberland Avenue, London, W.C. 2:—

Traction Engines for *Threshing and Other* Agricultural Purposes.

Farmers or contractors desiring to purchase new steam traction engines for agricultural purposes must make application to the Director, Agricultural Machinery Department, Ministry of Munitions of War, 8, Northumberland Avenue, London, W.C. 2. Such application must be accompanied by a recommendation from the local War Agricultural Committee; or the Board of Agriculture and Fisheries, in the case of England and Wales; the Board of Agriculture in the case of Scotland; or the Department of Agriculture and Technical Instruction in the case of Ireland; stating that it is in the urgent national interest that permission to purchase such traction engine should be given. **It should be specially noted that the supply of new steam traction engines is at present limited, and as there are no restrictions on the purchase of second-hand engines the buying of these is recommended.**

Threshing Machine Repairs: Notice to Owners.

THE Field Services Section of the Food Production Department desire to request owners of threshing machinery in need of essential repairs to communicate in good time with the Department so that arrangements can be made for getting the machines put into proper order. From inquiries received, it seems probable that quite a number of threshing machines require partial overhauling or the supply of important parts. In many instances, no doubt, this work can be done locally with available material. Only where this is not the case, and the repairs are absolutely necessary to efficient working, should the Department be written to; but in such event the utmost promptitude is desirable so that there shall be no needless delay when the machinery is required. Applicants to the Department should be as explicit as possible in their statements as to the nature of the repairs to which attention is directed, and should state the names of the firms who will carry out the work.

Harvesting Machinery for 1918 Harvest.

THE following letter (No. 113/M. 1), dated the 28th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

SIR,—The Department desire to inform County Agricultural Executive Committees of the steps taken for the provision of harvesting machinery for the harvest of 1918. Orders have been placed for 5,000 binders and for a small number of reapers. No orders have, however, been placed for mowers (other than combined mowers and reapers) or horse-rakes, since it is considered that in view of the reduction of the area under hay there should be a surplus of these implements in the country, and Committees should arrange to hire or purchase locally any that are required; proposals for the purchase of such implements should, in accordance with the established rule, be submitted in the first instance to the Department.

2. *Binders.*—Although every effort is being made to secure delivery of 5,000 binders, it is not certain that the full number will be obtained in time for the harvest. The binders will be principally machines with a 6-ft. cut, but a small number of 5-ft. binders will be available. In the first place, any prisoner-of-war centres established in your county will be supplied with binders according to the number of teams of horses provided at those centres, approximately at the rate of one binder to every three teams. These binders will in each case have a 6-ft. cut. The number of binders already allocated for prisoner-of-war centres in your county is.... If this number is considered inadequate, application should be made for the *additional* number required.

In the second place, binders will be supplied for use with gangs supplied under F. P. 92. It is proposed that these binders also shall be chiefly 6 ft., and Committees are requested to state the number of binders required under this head. Six-ft. binders will also be supplied on application by Committees for use with tractors.

After binders have been allotted to prisoner-of-war centres and to Committees for use with horse-gangs and tractors, the balance, if any, will be available for distribution to Committees who may wish to hire them to farmers.

3. *Reapers.*—It is proposed to supply reapers in substitution for binders to counties where the former are particularly in request, but

the number available will, in any case be small, and Committees should not make application for reapers unless they are essential. The machines supplied will be chiefly combined mowers and reapers with back delivery and 4-ft. 6-in. cut.

4. *Binder Twine.*—It is proposed to supply binder twine to Committees in bulk; any twine supplied must be used exclusively for the Department's binders under their control. Great care must be taken that the twine is not used for any other purpose, and the bale should not be opened except in the presence of a responsible officer of the Committee. The requirements of prisoner-of-war centres will be met directly by the Department.

5. *Charges.*—The following charges are suggested:—

	s.	d.	
Binder, team of 3 horses, 2 men and twine..	12	0	an acre.
Binder, tractor, 2 men and twine	12	0	,,
(Where twine is not supplied 4s. an acre may be deducted.)			
Reaper, team of 3 horses and 2 men ..	8	0	,,
Reaper, tractor and 2 men	8	0	,,
Binder alone, without twine	2	6	,,
Tractor with driver: minimum charge ..	6	0	,,

The Department are prepared to consider variations from these charges to meet local conditions, but it is necessary in each case that cost shall be covered.

6. *Labour.*—Provision has been made in the scale of charges for two men to be employed with a team of three horses when used with a binder, and it is proposed that the second man shall keep the knives sharp and give other necessary assistance in order that no time may be lost. Where tractors are used, two men are in any case required. It will be observed that the Department anticipate that tractors will be employed in some cases to draw binders which are the property of farmers: the man on the binder may be supplied either by the tractor representative or the farmer, but in any case the farmer will be required to meet the charge for his wages.

7. *Applications for Binders, etc.*—Committees should submit as soon as possible an estimate of their requirements; the estimate should be carefully framed, after taking into consideration the number of binders allocated to prisoner-of-war centres. It will be convenient if the estimate is submitted in the following form:—

Number required.	Binders.		Reapers.	
	6 ft.	5 ft.	Back Delivery.	Side Delivery.
For Prisoner-of-war Centres* ..				
,, Horse Gangs				
,, Tractors				
,, Hire to Farmers				

Binder twine required .... cwt.

* The number of binders (if any) inserted under this head should be *additional to those already allocated.*

Committees will be asked to give consigning instructions when it has been decided how many machines can be allocated to each county.

The Department will be glad if this letter may be considered at an early meeting of your Committee, and if a reply may be received in this office not later than the 13th April.

I am, etc.,

(Signed) HUGH M. STOBART,

Director, Machinery Supplies.

The following Circular (No. 119/M. 1), dated 5th April, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Use of Tractors. SIR,—I desire to direct the attention of Agricultural Executive Committees to the importance of making the fullest possible use of tractors in cultivating, cleaning and seeding land during the next two months.

The heavier types of tractor designed chiefly for ploughing are not always well adapted for cultivating land that has been ploughed up for spring crops; but light tractors (notably Fordson's and Burford Cleveland's) can be used on any land on which a horse may safely work.

Fordsons are now being distributed to Committees in considerable numbers, and unless urgently required to complete ploughing contracts, they should be set to work with cultivators, disc or drag harrows, rollers and drills immediately. Recent trials have shown them to be very well adapted for work with these implements.

If tractor implements are not always available, ordinary horse implements should be used. These can readily be hitched to the tractor, and Committees who have not got supplies at hand should requisition them from the Department without delay.

The very fine weather of the past two months has enabled all farmers to get well forward with the sowing of corn crops, and there is now an opportunity of cleaning land properly before roots are sown. The urgency and importance of this work cannot well be exaggerated. If the opportunities now given by the season are taken advantage of, the green crop fallows of 1918 will be clean, and the foundations for successful corn harvests in 1919 and 1920 will be laid.

For a second reason Agricultural Executive Committees should make the fullest use of light tractors in cultivating arable land during the next two months. Agriculturists in all parts of the country must be given an opportunity of gaining experience with tractor-drawn implements. As the result of their efforts to increase the area of arable land during the past year, farmers will have some 2,000,000 extra acres of stubbles to till next season. For the tillage of much of this large additional area, reliance must be placed on the tractor, and it is, therefore, most desirable that tractor-drawn implements should now be tested in different localities and the best types selected, manufactured, and distributed in suitable numbers to the districts in which they will be needed in 1919.

At present the Department are almost without information from Agricultural Executive Committees respecting the probable demand for implements within their areas, and, in its absence, estimates for future supplies can only be based on evidence of past sales. In the case of new implements, like disc cultivators, this indication is, obviously, of little value and must be supplemented by reports from each district.

Orders for implements of new types for delivery in spring, 1919, must soon be placed, and if the next two months are allowed to pass, and the experience of new implements which might be gained in them is not communicated to the Department before Midsummer, farmers cannot expect to secure such improved patterns as they may think desirable before 1920.

Additional copies of this letter are enclosed for the information of your District Committees, and a further supply will be forwarded to you if required.

I am, etc.,
(Signed) A. LEE,
Director-General.

THE following Circular Letter (No. 46/6L.2), dated 21st March, 1918, has been addressed to County Agricultural Executive Committees, County Borough Councils in England and Wales, and to the London County Council by the Food Production Department of the Board:—

Sale of Horses Order, 1917.

SIR,—Experience has shown that there is a shortage of horses suitable for agricultural and the essential trades, and it has become more than ever necessary to protect these interests.

In some counties the shortage of horses for land cultivation is so pronounced that the Committees are experiencing great difficulty in obtaining the horses required for the increased cultivation programme. It is therefore *most important that before issuing any licence for the sale of a horse, full investigation should be made by the Committee through their parish representative to ensure that the horse is really surplus to the requirements of the holding concerned, having strict regard to any increased area of land which should be brought into cultivation on the holding,* and that *all surplus horses should be brought to the notice of the Board's Purchasing Officer.*

The condition of road transport having become seriously affected owing to a variety of causes, more reliance will have to be placed upon horse transport for essential trades. The Board of Trade have therefore appointed a Controller of Horse Transport who is vested with powers as to the disposal and distribution of the horse power of the country, other than horses engaged, wholly or mainly, in agriculture or Army horses.

It will, however, be necessary for the Controller to make some demands upon the surplus agricultural horses, and the Department have agreed to assist the Board of Trade by placing at the disposal of purchasers authorised by the Controller of Horse Transport such *surplus agricultural horses as may not be required by the Army or the Board's Purchasing Officers.*

I am accordingly to request that licences issued in respect of horses so released from agriculture shall have the words "*or the Controller of Horse Transport*" inserted in Clause No. 1 of the form of licence after the words "Army Council," as a person who may authorise the purchase of the horse.

In view of the shortage of horses, and because considerable leakage has been taking place, it has been found necessary to alter the form of licence so as to limit the sale to—

(*a*) An occupier of an agricultural holding *who purchases it for use wholly or mainly for the cultivation of that holding*, and who

shall, before delivery of the horse, sign the attached statement* to that effect; or

(*b*) A person duly authorised by the Board of Agriculture and Fisheries or the Army Council to purchase the horse.

Note.—To sub-section (*b*) Committees will add the words "or the Controller of Horse Transport" after the words "Army Council," in certain cases as indicated above.

The alteration in the form of licence will have the effect of shutting out occupier dealers as dealers, but owing to the fact that the Army Council, the Food Production Department, and the trades represented by the Controller of Horse Transport (such as railway companies, etc.) must have the service of collector dealers, it is proposed to licence dealers separately under conditions which are at present under consideration.

Each of the Departments concerned will licence its own dealers, and Agricultural Executive Committees are asked to forward to this Department the names and addresses of a limited number of reliable dealers resident in their area.

The new form of licence for the Sale of Horses Order is now in the printer's hands and a supply will be sent to each Committee shortly.

In future the Department would be glad to be informed, at the end of each month, of the number of licences issued by your Committee, and as to how many of these were in favour of the Controller of Horse Transport.

I am, etc.,
(Signed) ARTHUR LEE,
Director-General.

THE following Circular Letter (No. 14/H), dated 19th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

The Formation of Horticultural Sub-Committees.

SIR,—I desire to call the attention of your Committee to the urgent necessity for the formation of a Horticultural Sub-Committee for the purpose of stimulating the production, marketing, and conservation of food by allotment holders and small cultivators generally in your county.

The functions of such a Horticultural Sub-Committee are dealt with in the enclosed memorandum, and a study of the subjects referred to in the memorandum will, I feel sure, convince your Committee both of the importance and urgency of at once establishing a Horticultural Sub-Committee of the County Agricultural Executive Committee, if this has not already been done.

To mention two of the subjects referred to in the Memorandum, viz., the need of taking immediate steps to secure the marketing of surplus produce grown by small cultivators, and the importance of increasing the amount of livestock suitable for keeping by small cultivators, will suffice to show that the Food Production Organisation of the county cannot be considered complete until the horticultural aspect of these subjects has been dealt with upon the lines suggested in the Memorandum.

It is the desire of the Food Production Department that horticultural work in the county should be regarded as an integral part of food production. It is recognised at the same time that the Agricultural Executive Committees are so fully occupied with the important services which they are rendering to agriculture as to be unable to assume as part of their routine duties the promotion of horticultural food production, and it is for these reasons that I have to ask the County Executive Committees to take, without delay, the necessary steps for establishing the Horticultural Sub-Committees referred to in the Memorandum.

I shall be glad to be informed in each case when this has been done.

Yours faithfully,
A. LEE,
Director-General.

ENCLOSURE.

At a recent conference, presided over by the Director-General of the Food Production Department, which was attended by representatives of county and other organisations, on the subject of marketing surplus food produce, it was unanimously resolved to further the Department's proposal for establishing Marketing Committees in each county of England and Wales.

It is considered by the Food Production Department that the organisation of marketing as well as that of food production by small cultivators should be entrusted to the Sub-Committee of the Agricultural Executive Committee.

In many counties a Horticultural Sub-Committee has already been appointed by the Agricultural Executive Committee and has, with the assistance of District and Village Committees, formed an effective County Organisation. It is important that this course should be adopted immediately in all counties.

The main objects with which the Horticultural Sub-Committees would concern themselves are :—

(1) To encourage and co-ordinate schemes for cultivating ground by small cultivators and allotment holders.

(2) To inquire into the existing County Organisations for promoting food production by small cultivators and allotment holders, and, where necessary, to secure that in each rural and urban district and in each borough there is a district or borough Horticultural Food Production Committee.

(3) To nominate, where necessary, new horticultural representatives for appointment by the Department and to revise the existing list of horticultural representatives with a view to dispensing with the services of those whose work is not considered to be satisfactory.

(4) To secure the formation of an Executive Marketing Committee for the purpose of marketing the surplus produce grown in allotments and gardens.

(5) To advise the Food Production Department on the most economical and effective means of employing in the county the Department's staff of special lecturers and demonstrators for the purp[illegible] supply of lecturers.

LIBRARY

(6) To promote schemes for the keeping of live stock, such as rabbits, poultry, etc., and bees by small cultivators and allotment holders.

In those counties where a County Horticultural Committee has already been formed the Department would suggest that the existing Committee should be recognised by the Agricultural Executive Committee as its approved agent or authority for the purpose of horticultural work in the county, but in such cases it is nevertheless considered necessary that the Agricultural Executive Committee should secure that any Horticultural Committee now in existence should be reformed as a Sub-Committee of the Agricultural Executive Committee.

The Horticultural Sub-Committee should, wherever possible, consist of :—

(1) A chairman selected for his special interest in horticultural subjects, who is either a member of the Agricultural Executive Committee or of the War Agricultural Committee.
(2) A representative of the Women's War Agricultural Committee.
(3) A representative of the Local Education Authority.
(4) Two of the existing Rural District, Urban District or Borough Horticultural representatives.
(5) Ex-officio members : the Department's District Commissioners and Sub-Commissioners.

The Department are not anxious that the Horticultural Sub-Committee should be large, but at the same time they consider that it should be thoroughly representative of the horticultural interests of the county. The Department deem it desirable that, where the assent of the County Council can be obtained, the Horticultural Instructor or Advisor to the County Council should act in a similar capacity to the Horticultural Sub-Committee and, in particular, should undertake the general direction in technical matters of the horticultural representatives in the county.

The County Horticultural Sub-Committee would proceed to form Horticultural Food Production Committees in each urban and rural district, and these in turn would form Village Committees. In many cases these Committees are already in existence and are actively carrying on the work of Food Production, and it only remains for them to be linked up with the County Horticultural Sub-Committee.

In the case of boroughs which are at present outside the scope of the County Horticultural Sub-Committee, an amicable arrangement might be come to whereby the whole area would come under the Horticultural Sub-Committee.

Horticultural representatives for separate districts and boroughs would continue to be appointed by the Department, but only on the nomination of the Horticultural Sub-Committee. They should act as technical advisors to the District and Borough Horticultural Food Production Committees in the same way as the County Horticultural Instructor or Advisor acts in relation to the County Horticultural Sub-Committee. The horticultural representative should be instructed to report to the Sub-Committee and not to the Department.

The Department allow a grant of £10 a year for the out-of-pocket expenses incurred by each horticultural representative, and it is proposed to ask the Horticultural Sub-Committees to pay this sum out of a block grant to be provided by the Department.

The Department have approached the Treasury for sanction to pay a salary to the Secretary of the County Horticultural Sub-Committee on the following conditions :—

(1) The Secretary should be nominated by the Sub-Committee, but his appointment should be approved by the Department.
(2) Having regard to the fact that the most immediately pressing duties of the Sub-Committee would be to make provision for the organisation of the marketing of the surplus produce raised by the small cultivator and allotment holder, the Sub-Committee should at once proceed to appoint a County Marketing Executive Committee on the lines of the Memorandum on Marketing provided by the Department.
(3) Wherever possible the Secretary of the Sub-Committee should also act as Secretary of the Marketing Executive Committee. In cases where this is not found possible the Horticultural Sub-Committee will be asked to submit proposals to the Department for the allocation of the salary as between the two secretaries whom it may be necessary to appoint.

THE Prime Minister issued in March the following appeal to farmers and others to grow more potatoes :—

The Prime Minister's Appeal for a Million Acres Under Potatoes.

"I desire to impress upon all farmers and small growers the vital importance of increasing to the utmost extent possible the supply of potatoes this year.

There is no crop under existing war conditions which can compare with it in importance as a food for either man or beast, and it would be quite impossible to plant too many potatoes this spring.

Last year I appealed to the farmer to grow more potatoes, and he responded by beating all records. This year I appeal again, and with even greater earnestness, because the need is twice as great.

If we can get a million acres under potatoes in Great Britain this year, the food situation will be safe, and farmers will have rendered an immense service to their country.

The potato-grower is in the front line of the fight against the submarine. He can defeat it if he chooses, but victory depends on his action and exertions during the next few weeks."

(Signed) D. LLOYD GEORGE.

THE following Press Notice was issued by the Food Production Department on 5th April :—

Potato Growing: Urgent Need for Greater Activity.

British farmers as a body have responded admirably to the call of the Government for increased production; and the outlook for our corn crop is extremely encouraging. Unfortunately, the potato prospect is by no means so satisfactory. Up to the present it is doubtful whether as much land has been prepared for potatoes this season as last; and it is hardly to be expected that the 1918 yield will be as large as that of the 1917 crop, which was well above the average.

The Prime Minister a few weeks ago appealed to farmers to grow more potatoes this year than last year, when, in response to his earlier

appeal, the farmer beat all records of potato planting in England and Wales. A certain number of large growers have been moved by the Premier's recent message to arrange for the growing of more potatoes, but this movement does not seem to be general.

As the Food Production Department points out, the situation is most serious. We need 1,000,000 acres of potatoes in Great Britain this year to make the food situation safe, and only the farmers can give us this 1,000,000 acres. We want another 1,500,000 tons of potatoes grown this year—apart from the allotment holder and gardeners' crops; and only the farmers can grow them. As things now look, there is reason to fear that we may be as much as 400,000 acres short of our probable requirements in potatoes during 1918. This must be prevented at any cost.

Many farmers have protested against the proposal that they should increase their 1918 acreage under potatoes because they have been unable to sell satisfactorily a large part of their 1917 crop. The Ministry of Food has met them in this difficulty on quite liberal lines. *On 15th May, 1918, the Food Controller will purchase all sound ware potatoes in the United Kingdom for which the grower cannot otherwise find a market. The Food Controller will pay not less than £7 per ton for 4-ton lots f.o.r.* Whilst the base price for potatoes will remain unaltered until further notice, compensation claims will be based on the minimum price of £7 per ton on and after 15th May, as compared with the minimum price of £6 10*s.* from 15th April. Every farmer who redresses his clamps for the purpose of extracting the seed for planting or for sale for planting and reclamps the ware will receive from the Ministry of Food an additional 10*s.* per ton for each ton of sound ware potatoes subsequently sold from the new clamps.

These concessions in relation to the remainder of the 1917 crop should induce many hesitating farmers to increase their 1918 acreage of potatoes. The Ministry of Food has already guaranteed to buy at minimum prices of from £6 to £7 per ton all the crop grown on new land this year and to pay a generous price for the remainder of the 1918 potato crop—prices for the latter being fixed by a Joint Commission of the Board of Agriculture and the Ministry of Food after visiting each area and taking evidence from the growers as to yields, cost of production, etc.

It will be seen that potato growing by farmers this year promises to be a very sound business proposition. It is also a patriotic duty of the highest importance. That the farmers of the country will not rise to the level of the occasion is unthinkable, after their remarkable achievement in the matter of corn crops.

More Potatoes Wanted: Scheme of Ministry of Food to Make Counties Self-Supporting.

A VIGOROUS campaign has been inaugurated by the Ministry of Food with the object of securing an increase in the acreage under potatoes in those counties of England and Wales which, if they are to become self-supporting in the matter of potato supplies, have to wipe out a deficit on last year's crop by planting seed within the next few weeks more extensively than ever.

Details of the Ministry's scheme for dealing with the 1918 crop have already been published in this *Journal*.* For

* February, 1918, pp. 1222–3.

the information of agriculturists, market gardeners and allotment holders, those arrangements may be briefly reiterated as follows :—

Every grower of potatoes will have a free market for the sale of his produce up to 1st November.

On 1st November the Food Controller will take over the crop at a purchase price which will be assessed by a Joint Commission appointed by the Food Controller and the President of the Board of Agriculture. This Commission will visit various districts of the country and examine the general average size of the crop in the district, the quality of the potatoes, and the general average cost of production. They will then assess the final purchase price of the crop for the district ; but in any case this final purchase price will not be less than an average (according to time of delivery) of £5 15*s*. per ton for those sound ware potatoes which naturally fetch the lowest price in the market. This bottom figure in the scale of purchase price has been fixed in relation to the average cost of production in the fen lands of Cambridgeshire, where potatoes are usually produced most cheaply. It is important to notice that as the minimum purchase price will be calculated on this basis, the actual purchase price in other districts will be proportionately advanced if it can be proved to the Commission that this minimum price will not secure an adequate return for the farmer.

The advantages of this policy over the 1917 arrangement will be obvious. In 1917 a flat price of £6 per ton for all farmers and all classes of potatoes was guaranteed. The inevitable result was that every purchaser of potatoes naturally wanted the best quality, and it was difficult to secure a market for the cheaper qualities. Under the 1918 arrangement people who want a better quality of potato will obviously have to pay a higher price for it, and those who produce the cheaper qualities will not be robbed of their natural markets, and, moreover, growers will have an absolutely sure market for potatoes.

With a view to economy in transport, the distribution of potatoes will probably be effected by dividing the country into different zones, a zone being approximately of the size of an average county. The general idea is that people living within any zone should be encouraged if possible to grow all the potatoes they require ; but if it is proved impossible the deficit required for consuming purposes will be drawn, not from distant parts of the country, but from the nearest surplus zone.

COUNTIES WHICH SHOW A DEFICIT.

The following table shows, in round figures, the counties where deficits exist, and the Ministry invites the co-operation of all growers in those counties to make this scheme of supplies a success :—

County.	*Produced.* Tons.	*Consumed.* Tons.	*Deficit.* Tons.
Rutland	1,400	1,800	400
Oxford	16,200	16,700	500
Isle of Wight	3,900	7,700	3,800
Wiltshire	19,200	26,900	7,700
Buckingham	13,300	21,100	7,800
Dorset	12,300	20,200	7,900
Northampton	16,000	27,300	11,300
Berkshire	11,100	26,100	15,000
tingham	42,300	58,200	15,900
ierset	24,800	41,800	17,000

County.	*Produced.* Tons.	*Consumed.* Tons.	*Deficit.* Tons.
Suffolk	24,500	42,400	17,900
Leicester	15,900	46,000	30,100
Monmouth	8,700	39,600	30,900
Sussex	26,600	58,900	32,300
Northumberland	35,000	68,700	33,700
Hampshire	40,300	76,900	36,600
Stafford	86,100	124,700	38,600
Surrey	43,000	82,300	39,300
Derby	21,400	65,600	44,200
Essex	89,600	133,900	44,300
Gloucester	19,300	69,400	50,100
Durham	61,000	133,900	72,900
Warwick	39,300	125,100	85,800
York	297,000	387,700	90,700
Glamorgan	20,500	111,700	91,200
Middlesex	17,100	117,000	99,900
Lancaster	351,800	455,500	103,700
London	2.300	423,800	421,500

It is well-known that there are certain potato-producing areas in the country whose task in years gone by has been to supply the necessary potatoes for the non-producing areas. If there is any fear that the present scheme may rob the producing areas of their markets, that fear may be dispelled by pointing out the arrangements that are in course of completion for the erection of factories in these producing areas to absorb any available surplus for the manufacture of potato flour and other products, which incidentally will yield valuable by-products for cattle food.

It is not proposed to compel any allotment holder to sell his produce; but if any number of allotment holders like to group themselves into an association, affiliated to the County Associations of the Food Production Department, and, after having provided for their own requirements, they have a surplus of which they wish to dispose, the Ministry of Food will purchase that surplus on exactly the same terms at which they are purchasing from farmers. Apart from the ordinary purchase price of the crop, the Ministry is prepared to enter into forward contracts for the produce of any acreage in excess of what was planted in 1916. The contract price for potatoes of this description has been fixed (according to the time of delivery) at an average of £6 10*s.* per ton; but there is a Clause in each contract that in no case will this contract price be allowed to fall below the final purchase price assessed by the Joint Commission. (*The National Food Journal*, 27th March, 1918.)

THE following Notice was issued to the Press by the Food Production Department of the Board on 8th April:—

The Potato Crop: The Question of Fertilisers. There is still time to reach the increased acreage of potatoes appealed for by the Prime Minister a fortnight ago; and, in the interests of national security, no obstacles such, for example, as local scarcity of farmyard manure or sulphate of ammonia, should be allowed to stand in the way. Grass land is generally in a condition to produce satisfactory crops without the aid of such r

particularly if, on ploughing, it breaks into a loose friable tilth, and so long as a dressing of about 4 cwt. per acre of superphosphate is available, other manures may be largely, if not entirely, dispensed with.

THE following Letter (No. 22/S.2), dated 28th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

The Supply of Seed Potatoes.

SIR,—In view of the urgent necessity for increasing the acreage under potatoes in England and Wales in 1918 I invite your Committee to co-operate with the Department in providing facilities for the distribution of further quantities of seed potatoes of approved main crop varieties to allotment holders, cottagers, small holders and farmers in your county during the next few weeks, while planting is still possible.

The Department are prepared to give prompt delivery through Agricultural Executive Committees, approved seed potato dealers, allotment societies and food production societies in your county on the lines of the existing scheme, and your Committee can also supply farmers with any quantity of not less than 4 tons of one variety.

I greatly appreciate the efforts which have already been made by your Committee to increase food production, but I feel that the potato crop is of such vital importance to the nation during the coming year that a very special effort should be made to secure the area of 1,000,000 acres for which the Prime Minister has so earnestly appealed.

I have arranged for a supplementary supply of "seed" to be put at the disposal of the Executive Committees in order that every possible aid may be given to those growers who can be induced to increase their acreage, and the Department will send you particulars of varieties and quantities with their prices on application.

The Ministry of Food is about to issue an announcement as to this year's crop, of which an advance copy will be sent to you. It will, I feel sure, show the anxiety of the Government to give full consideration to the interests of potato growers.—I am, etc.,

(Signed) A. LEE,
Director-General.

THE following Notice was issued to the Press by the Food Production Department of the Board on 8th April :—

Onions: The 1918 Crop.

The attention of all growers of onions is drawn by the Food Production Department to the following announcement with respect to the 1918 crop :—

"In view of high freights and restrictions in shipping it is extremely important that the home production of onions should be increased very largely and up to the fullest extent which the supply of seed will allow. In the notice issued by the Department on the 7th March, it was stated that the Ministry of Food had fixed prices for onions. The statement should have read as follows : The Ministry of Food announces that in the event of it becoming necessary to fix any maximum growers' prices for the British Onion Crop of 1918, the prices will not be less than those indicated in the following scale :—

Early Autumn (up to 1st November) ..	£15	f.o.r., f.o.b.
Late Autumn (1st Nov. to 1st Jan.) ..	£16 10s.	"
Winter and Spring (after 1st January) ..	£18	"

THE following Memorandum (No. 40/C. 1), dated 30th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

The Sowing of Seed Mixtures.

Inquiries have been addressed to the Department as to the policy which should be adopted in sowing seed mixtures during the present spring. In view of the shortage of feeding-stuffs, the hay crop is likely to be specially valuable in 1919, and it is desirable that farmers should sow the normal area of "seeds" for one year's ley. On the other hand, a reduction is desirable in the sowing of two and three year leys, and only in exceptional circumstances should the sowing of mixtures of permanent grasses be permitted.

THE following Notice was issued in March by the Food Production Department of the Board:—

Bare Fallows or Crops.

The Food Production Department strongly recommends farmers to reduce to the lowest possible limit the area under bare fallow. Advantage should be taken of the fine weather to clean foul land; and, should the season continue favourable, a large proportion of the land usually fallowed might be put under crop. Tractors are available for cultivating, cross-ploughing, etc., for which purposes they compare favourably with any other means of cultivation. Farmers desiring to hire tractors should apply to their County Agricultural Executive Committee.

THE following Notice, dated 22nd March, 1918, has been issued by the Food Production Department of the Board:—

Superphospate Supplies: Important Notice.

Owing to an unexpected increase in the output of superphosphates, there is a possibility that farmers and allotment holders may be able to secure additional supplies. They should place their orders at once with their usual merchants or co-operative societies, even if they require delivery as late as May.

If merchants say that no further supplies are available, inquiry should be addressed promptly to the Food Production Department, 72, Victoria Street, S.W. 1.

Superphosphates are especially valuable in increasing potato crops. An Order is about to be issued fixing the prices for the sales of small quantities from merchants' stores.

THE following Notice was issued towards the end of March by the Food Production Department of the Board:—

Sunflower Seed Prices.

It has been brought to the notice of the Food Production Department that growers are unable to obtain supplies of American Giant Sunflower Seed at the prices mentioned in the Notice recently issued by this Department,* viz., 3*d.* per oz., 9*d.* per 4 oz., or 1*s.* 3*d.* per 8 oz. A considerable quantity of this variety of sunflower seed has recently been released at a price which enables retail seedsmen to sell at these rates. The Department will be glad

* See page 1467 of this *Journal* for March, 1918.

to supply retail seedsmen with the names of the wholesale firms from whom they can obtain supplies of this seed.

The seeds of the Giant strains of sunflower are rich in oil and a valuable food for poultry, and it is very desirable that they should be cultivated on vacant land which is not suitable for food crops.

Full information as to cultivation and harvesting can be obtained from the Food Production Department, 72, Victoria Street, S.W. 1.

THE following Notice was issued towards the end of March by the Food Production Department of the Board :—

Celery Leaf Blight. A serious disease of celery, called Celery Leaf Blight, is often the cause of the partial or complete failure of the crop. The disease may be recognised by local crumbling of the leaf followed by the appearance of spots on the surface of the leaf, and when the attack is serious the stalk rots.

Since the disease is often carried in the "seed," growers of celery are advised to disinfect their seed. In order to do this, hydrogen peroxide should be used.

When purchasing hydrogen peroxide, if it can be had, a solution known as 20-volume solution should be bought, but if that cannot be obtained a 10-volume solution may be used. The seed to be treated is placed in a glass or earthen vessel and enough of the hydrogen peroxide ponred into it to cover the seed completely. Stir the mass thoroughly so that all the seeds become wet. Allow the seeds to remain in the liquid for 3 hours and then pour the liquid off and use it a second time if required. Spread the seed in a thin layer in the air before sowing. Do not return the seed so treated to the original packets or else some of the spores of the fungus causing the disease adhering to the paper of the packets may reinfect the seeds. If carried out carefully no damage to the seeds results, and the celery will have the chance of remaining free from the disease.

It may, however, become infected later on, and in that case the disease may be checked by spraying with Bordeaux or Burgundy mixture. The spraying should be begun at the first sign of the disease and must be repeated if the first spraying does not check it.

For instructions for making Bordeaux mixture, see Leaflet F.P. 142/H., "Potato Disease and its Prevention," which may be obtained on application to the Director-General, Food Production Department, 72, Victoria Street, S.W. 1.

THE following Notice was issued towards the end of March by the Food Production Department of the Board :—

The Value of Soot. Household soot is a valuable manure and insect deterrent.

Where possible, the Food Production Department advises allotment holders to arrange, when having their chimneys swept, to keep the soot for use as a manure.

Good soot contains at least 3 per cent. of nitrogen, and is specially suitable for all members of the cabbage family and the onion crop, as well as being beneficial to all crops during the early summer, if sown between the rows. It also darkens the colour of the soil, and increases its power of absorbing heat.

A dressing equivalent to the usual application of sulphate of ammonia would be at the rate of 10 cwt. or 40 bush. per acre, or 7 lb. per rod. Heavy applications should not be given to the foliage of tender crops such as carrots, or burning may result.

Soot should be stored under cover for a time before it is used on a growing crop. A good sample weighs 28 lb. per bush.; heavier samples are usually of poorer quality.

AN Order (No. 325), dated 16th March, 1918, has been made by the Food Controller providing that:—

The Live Stock (Restriction of Slaughter) Order.

1. No person shall slaughter any beast unless such beast has within the 14 days immediately preceding the day of slaughter been sold or bought in a market in Great Britain.

2. (*a*) No person shall bring or send or cause to be brought or sent to any market for sale for slaughter or sell for slaughter, or cause or permit to be slaughtered, any in-pig sow of any age, in-lamb ewe of any age, in-calf cow, or in-calf heifer, or any calf.

(*b*) An animal shall be deemed to be brought or sent or sold for slaughter if it is slaughtered within 14 days of its sale in the market to which it was brought or sent or in which it was sold.

3. The prohibition contained in Clause 2 hereof shall not apply to—

(*a*) Calves of the Ayrshire breed born in Scotland; or

(*b*) The slaughter of a calf which has been marked by a person authorised by the Food Controller in that behalf in the manner prescribed by this Clause and which bears such mark at the time of slaughter.

4. (*a*) The prescribed mark shall for the purpose of Clause 3 of this Order be a broad arrow branded in hot pitch or a mixture of hot pitch and tar on the head, the shaft and two barbs of the arrow to be a ½ in. in width, and the length of the shaft and of the barbs (outside measurement) to be 2½ in., or such other mark as may from time to time be prescribed by the Food Controller.

(*b*) No person shall mark any calf with the prescribed mark or with a mark colourably resembling the prescribed mark unless he be authorised in that behalf by the Food Controller.

5. The restriction of slaughter imposed by this Order shall not apply to:—

(*a*) Slaughter of an animal under the powers conferred by the Diseases of Animals Acts, 1894 to 1914, or any Order made thereunder.

(*b*) Slaughter of an animal when such slaughter is authorised by an officer of the Board of Agriculture and Fisheries or the Board of Agriculture for Scotland.

(*c*) Slaughter of an animal when such slaughter is immediately necessary or desirable on account of accidental injury to the animal or of its illness, or for any other exceptional reason or purpose. Provided that notice of such slaughter shall be given within 7 days thereafter to the Food Control Committee for the district in which the owner of the animal is at the time of the slaughter residing.

6. For the purpose of executing and enforcing this Order any officer of, or other person authorised by, the Food Controller may enter into any slaughter-house or other premises on which he suspects animals are being or have been slaughtered for human food and examine any animals or carcasses or hides therein, and inspect and require production of any books, or other documents relating to animals slaughtered on such premises; and no person shall impede or obstruct such officer or other person in the exercise of his powers under this Clause.

7. No meat obtained from any calf born in the British Islands shall be sold, supplied, or offered or exposed for sale for human consumption except:—

(a) To persons who in the ordinary course of their business are manufacturers of sausages, meat pies and other similar articles for the purpose of such business; or

(b) As an ingredient in a sausage, meat pie or other similar article.

9. The Live Stock (Restriction of Slaughter) Order, 1917, is hereby revoked as on the 18th March, 1918, but without prejudice to any proceedings in respect of any contravention thereof.

THE Food Controller by an Order (No. 374). dated 28th March, 1918, has made the following Amendment to the principal Order (No. 903 of 1917*) as subsequently amended by Order No. 247 of 1918*:

The Meat (Maximum Prices) Amendment Order, 1918.

1. The Schedule to this Order shall, as from the date hereof, be substituted for the present Schedule to the principal Order which shall as from that date be construed as if it had originally been made with such substitution.

2. The General Licences issued under the Principal Order, dated 24th December, 1917, and 14th January, 1918, are hereby revoked.

Schedule of Maximum Wholesale Meat Prices.

Beef and Veal, price per stone.			Mutton and Lamb, price per stone.	Pork, price per stone.
Home Killed.	Imported.		Home Killed and Imported.	Home Killed and Imported.
Carcass. *s. d.*	Hindqtrs. *s. d.*	Foreqtrs. *s. d.*	Carcass. *s. d.*	Carcass. *s. d.*
8 2	9 3	7 1	8 8	10 8

NOTE.—In ascertaining weights, the offals are to be excluded. In the case of pork, other than imported pork, the maximum rate of 10s. 8d. per stone is applicable if the offals are not included in the sale, and the maximum rate shall be 6d. higher if the offals are included in the sale. In each case the weight of the offals shall be excluded in ascertaining the weight of the carcass.

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* See this *Journal* for September, 1917, p. 678, and for March, 1918, p. 1473.

The Maximum Price for Fat Cattle.

THE recent announcement with regard to the duration of the present maximum price for fat cattle will allay any uncertainty that may have been felt by farmers in laying their plans for next year. The maximum price of 75*s.* per cwt. for cattle of the first grade or its equivalent in dead weight will not be lowered before June, 1919. Lord Rhondda has had under consideration the question of fixing the price of store cattle, on the ground that it is desirable in fixing a maximum price at one end of the scale to ensure that prices are controlled in the first stages of production. It is evident that where store cattle have been purchased in the ordinary competitive market the grazier, who is compelled to sell fat cattle at controlled prices, may make less profit than that to which he may claim to be entitled. The practical difficulties urged against fixing the price of store cattle have, however, so far proved insuperable. The matter was referred to the Sub-Committee of the Central Advisory Committee on Live Stock and Meat Supplies, and they have reported against any attempt to secure direct control or grading of store cattle beyond limiting sales to the extent that they should only pass through the hands of one dealer on the way from the breeder to the grazier. An exception must, of course, be made with regard to Irish stores, since a British as well as an Irish dealer is required. Acting on this advice, in which the Boards of Agriculture concur, Lord Rhondda has decided not to fix the price of store cattle.

Although control of store prices has been found impracticable at the moment, farmers will be able, now that the duration of the present price of cattle has been guaranteed to the middle of next year, to estimate what price they can afford to pay for stores, and it is hoped that in these circumstances the inflation which took place last year will not be repeated. In any case, the payment of inflated prices for stores cannot be accepted as a valid reason for any new increase in the maximum price of fat cattle. The position of the producer has been further improved by the increase in the maximum price which is to be paid to the farmer for cattle sold on the basis of the yield in meat. This dead-weight price has been increased from 9*s.* 2*d.* to 9*s.* 6*d.* a stone of 8 lb., or 1*s.* 2½*d.* a lb., to be paid on the weight of the dressed carcass and to include offal.

The objections raised by farmers to sales on the dead-weight basis have been mainly that the uncertainties with regard to weighing and identification were insuperable, and that the cattle would lose weight during a possible longer transit and delay before slaughtering. After consultation at the Ministry of Food, however, many of the misgivings of farmers with regard to sales on the new basis have been removed, and a provisional agreement has been reached. Wherever practicable authorised slaughter-houses run on co-operative lines by the farmers themselves will be established so that they can themselves supervise identification and weighing. The slaughter-houses will, as far as possible, be in the agricultural districts, so that difficulties will be reduced to a minimum. The change to the dead-weight basis will be effected gradually, and in every case only when satisfactory arrangements for slaughter and identification have been provided. Moreover the option as to whether sales should be on the live-weight or the dead-weight basis is left in the hands of farmers. Under the conditions necessitated by the coming of compulsory rationing throughout the country it is essential that exact estimates of the meat coming into any

area and, indeed, into any shop shall be available, and the necessary exactitude can hardly be secured except on sales by dead weight. (*The National Food Journal*, 27th March, 1918.)

The following Order (No. 375), dated 27th March, 1918, has been made by the Food Controller:—

The Pigs (Prices) Order, 1918.

1 (*a*) Where a person sells any live pig otherwise than by dead weight, the maximum price shall be at the rate of 21*s*. per score of the live weight.

(*b*) Where a person sells any live pig by dead weight or sells any dead pig, the maximum price shall, if the offals are included in the sale, be at the rate of 28*s*. per score of the dead weight, and if the offals are not included in the sale shall be at the rate of 26*s*. 9*d*. per score of the dead weight.

2. (*a*) Where a live pig is sold otherwise than by dead weight, its weight for the purposes of this Order shall be its weight as ascertained at the time of sale by the live-stock autioneer engaged in the sale or the market authority in whose market the pig is sold or as ascertained at any time after sale by a person authorised in that behalf by the Food Controller or a Food Committee; or if not so ascertained its weight at the place of slaughter.

Any directions given by any such live-stock auctioneer, market authority or other person with a view to the weighing of a pig for the purposes of this Order shall be duly complied with by all persons concerned.

(*b*) Where a pig, live or dead, is sold by dead weight, the dead weight of the pig shall for the purposes of Clause 1 of this Order be the weight of the dressed carcass excluding the weight of the offals.

3. Every person who in the course of his business buys any pigs and slaughters or causes to be slaughtered such pigs for the purpose of his business shall keep accurate records showing the prices paid for such pigs, and such other particulars as are necessary to show whether or not the provisions of this Order are being complied with, and shall make such returns as to his business as the Food Controller or a Food Committee may from time to time require. All such records and relevant documents shall be open to the inspection of any person authorised by the Food Controller or a Food Committee.

4. A person shall not sell or offer or expose for sale or buy or agree to buy any pig, live or dead, at a price exceeding the price applicable under the Order, or in connection with the sale or disposition or proposed sale or disposition of any pig enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

5. The foregoing provisions of this Order shall not apply to—

(*a*) boars or pedigree sows bought and sold specifically for breeding purposes;

(*b*) breeding sows; and

(*c*) pigs weighing at the time of sale less than 80 lb. live weight.

6. (*a*) No person shall sell or buy or offer to buy for slaughter any pig weighing at the time of sale or offer for sale less than 112 lb. live weight.

(*b*) Until the contrary be proved, a pig shall be deemed to have been sold and bought for slaughter if it be slaughtered within 28 days

(*c*) This Clause shall not apply to any sale or purchase for slaughter of a pig weighing less than 112 lb. weight, where slaughter is for any exceptional reason or purpose authorised by a Live Stock Commissioner or his representative, or by any officer of the Board of Agriculture and Fisheries, or the Board of Agriculture for Scotland, or the Department of Agriculture and Technical Instruction for Ireland.

NOTE.—This Order revokes the Pigs (Maximum Prices) Order, 1917, and the licences thereunder, dated 20th November, 1917, and 16th December, 1917. (Nos. 1124, 1193 and 1248 of 1917.)*

Census of Cows and Heifers.

IN reply to a question in the House of Commons as to the amount of the present production of milk in England, Scotland and Wales, Mr. Clynes said that the only available statistics were those obtained by means of the various censuses taken by the Ministry of Food and the Board of Agriculture, but, though the number of cows could be given, it was not possible to give exact figures as to milk production, since the average yield per cow was unknown, and there were no figures to show the proportion of animals calving in any season of the year. The census figures were as follows :—

1. Census of 2nd December, 1917 (joint by Ministry of Food and Board of Agriculture), showed :—

Dairy Cattle only.	*Cows and Heifers in Milk.*	*Cows and Heifers in Calf.*	*Other Breeding and Store Cattle 2 years and over.*
England and Wales	1,553,948	1,028,184	370,914
Scotland	239,317	210,794	47,373
Total ..	1,793,265	1,238,978	418,287
Grand Total	2,906,596		

It was estimated on 2nd December, 1917, by producers that they would sell (not produce) during three following months 125,801,646 imperial gallons.

2. Census by Board of Agriculture, 4th June, 1917.

	Cows and Heifers in Milk	*Cows in Calf but Dry.*	*Heifers in Calf with First Calf.*
England and Wales	1,831,443	271,537	361,814
Scotland	347,000	45,000	50,000
Total ..	2,178,443	316,537	411,814
Grand Total		2,906,794	

3. Census taken at request of War Office through Police, 21st April, 1917.

	Cows and Heifers in Milk.	*Cows in Calf but Dry.*	*Heifers in Calf with First Calf.*
England and Wales	1,735,328	365,700	421,508
Scotland	314,000	125,000	
Total ..	2,049,328	912,208	
Grand Total	2,961,536		

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* See this *Journal* for 1917, pp. 924, 1031, and 1147.

On 1st March, 1918, the product of not more than 57,364 cows was being used for the manufacture of condensed milk. The amount of milk converted into dried milk during the six months ending 31st December, 1917, was not less than 4,713,118 gal., while during the six months ending 30th January, 1917, it was not less than 2,648,961 gal. The amount of milk used by Nestlés in the manufacture of condensed milk in the six months ending 30th June, 1917, was 11,369,081 gal., and in the six months ending 31st December, 1917, 13 705,369 gal. (*The National Food Journal*, 27th March, 1918.)

Priority Supplies for Live Stock.

PROPOSALS are under consideration for an extensive scheme for the rationing of all live stock through priority certificates. Pending the completion of the scheme the Food Controller has decided to extend to certain other classes of live stock the existing system of priority certificates under the Cattle Feeding Stuffs (Priority Supply) Order, 1918,* which are now granted only to dairy cattle in milk. These additional classes and the maximum quantities of feeding stuffs under the certificates are: calves under 6 months old (½ lb. per day), horses which are maintained and used for agricultural purposes (10 lb. per day), breeding sows (4 lb. per day), and store pigs (1½ lb. per day).

In granting certificates the amount of feeding stuffs in the possession of the applicant will be taken into consideration, and in the case of sows and pigs no guarantee can be given that certificates can be granted for a supply during the summer months. The necessary forms of application for these certificates can be obtained from the Live Stock Commissioner for the area in which the applicant resides. (*The National Food Journal*, 27th March, 1918.)

The Milk (Registration of Dealers) Order, 1918.

THE Food Controller, by an Order (No. 281), dated 8th March, 1918, authorises, in addition to the dealing permitted by the above Order, the following dealings in milk:—

(*a*) *A sale in bulk by a producer* who is not registered as a retail dealer under the above Order of less than 17 gal. if such sale comprises substantially the whole of the output of the producer;

(*b*) A sale by a person licensed to deal in milk by wholesale of any quantity of milk to a registered retail dealer in milk;

(*c*) An accommodation sale by a person licensed to deal in milk by wholesale or by a registered retail dealer in milk to any other person so licensed or registered.

The Milk (Summer Prices) Order, 1918.

AN Order (No. 296), dated 8th March, 1918, has been made by the Food Controller, including the following Clauses:—

1. *Maximum Prices.*—No person shall directly or indirectly sell or offer for sale or buy or offer to buy milk at prices exceeding the maximum prices provided by or in pursuance of this Order.

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* See this *Journal*, February, 1918, p. 1307.

2. *Retail Maximum Prices.*—Until otherwise determined pursuant to this Order the maximum price applicable on the occasion of a retail sale of milk shall be —

(*a*) For milk delivered during the month of April, 1918, at the rate of 2*s.* 8*d.* per imperial gal., for milk delivered during the months of May, June and July, 1918, at the rate of 2*s.* per imperial gal., and thereafter until the end of September, 1918, at the rate of 2*s.* 4*d.* per imperial gal.;

(*b*) Where at the request of the buyer the milk is required to be delivered in bottles, and is so delivered to the buyer's premises, an addition may be made to the foregoing prices at the rate of 1*d.* per qt., provided the milk is bottled under proper sanitary conditions at or before reaching the seller's premises;

(*c*) The foregoing prices shall inclnde all charges for delivery, but it shall be permissible for a Food Committee for any area, from time to time, subject to the provisions of this Order, to fix for all or any of the milk sold within their area and not delivered to the purchaser's premises, a rate different from the rate for the time being applicable to milk which is so delivered.

3. *Wholesale Sales by Producers.*—(*a*) Where milk is sold wholesale by or on behalf of the producer the maximum price chargeable for milk delivered during the months mentioned in the first column of the following table shall be at the rate per imperial gal. set opposite the same in the second and third columns thereof:—

Month of 1918 in which Delivery takes place.	Rate per Imperial Gal. for Delivery in England or Wales.	Rate per Imperial Gal. for Delivery in Scotland.
	s. *d.*	*s.* *d.*
April	1 8	1 8
May	1 0	1 2
June	1 0	1 0
July	1 2	1 0
August	1 3	1 2
September	1 3	1 4

together in each case with a sum equal to the net amount of charges for railway transport actually incurred by the seller. Provided that the Food Controller may by notice under this Order fix as respects any area such higher prices as he may deem to be just when in his opinion it is proper so to do having regard to cost of production.

(*b*) The rates applicable under Sub-clause (*a*) of this Clause are fixed on the basis that the milk is delivered at the seller's expense to the buyer's premises or (at the option of the seller) to the buyer's railway station, and that in the latter case all charges for transport beyond the buyer's railway station are borne by the buyer. Where milk is not sold on this basis a corresponding adjustment shall be made in the rates, and for this purpose the cost of delivery to the buyer's premises or the seller's railway station shall be reckoned at a sum not less than a sum at the rate of ½*d.* per gal.

(*c*) No additional charges may be made

4. *Wholesale Sales by Persons other than Producers.*—Where milk is sold wholesale by or on behalf of any person other than the producer the maximum prices chargeable shall, until otherwise determined pursuant to this Order, be as follows :—

(*a*) In the case of milk delivered by the producer to or for the account of the buyer in accordance with the directions of the seller the rate shall, until the end of September, 1918, be ½*d*. per imperial gal. higher than the rate (not exceeding the maximum price) payable therefor to the producer by the seller.

(*b*) In the case of milk not so delivered, the rate shall be in accordance with the following table :—

Month of 1918 in which Delivery takes place.	Delivery in England, Wales and Scotland.	
	*Rate per Imperial Gal. when Delivery is made to Buyer's Railway Station.	Rate per Imperial Gal. when Delivery is made to Buyer's Premises.
	s. d.	s. d.
April	*1 10	2 0½
May	*1 2	1 4½
June	*1 2	1 4½
July	*1 2	1 4½
August	*1 6	1 8½
September	*1 6	1 8½

* In addition to the railway charges paid by the seller for transportation from the seller's station to the buyer's station.

(*c*) The rates mentioned in Sub-clause (*b*) are fixed upon the basis that the cost of providing churns or other vessels is borne by the seller ; and where milk is not sold on this basis, then the rate shall be ascertained by deducting from the rate applicable under such Sub-clause the sum of ½*d*. per imperial gal.

(*d*) Except in the cases to which Sub-clause (*a*) of this Clause applies no milk shall be sold wholesale by or on behalf of a person other than the producer of the milk sold except upon the terms that the milk is to be delivered by or at the expense of the seller to the buyer's premises or the buyer's railway station.

5. *Power to Vary Maximum Prices.*—A Food Committee may except in the case of wholesale sales by or on behalf of producers, from time to time by resolution, vary the maximum price for milk delivered within their area or any part of such area but :

(*a*) Every such resolution shall be reported to the Food Controller within five days and shall not take effect until three days after the same has been sanctioned by the Food Controller, and

(*b*) Every resolution of a Food Committee under this Clause shall be subject at any time to review by the Food Controller, and shall be withdrawn or varied as he may direct.

6. (*a*) *Price to Establishments.*—Where milk is sold to an establishment as herein defined by any person (whether he be the producer of the milk sold or not) in a quantity of not less than 17 imperial gal., to be delivered in any one day, the maximum price (including charges for delivery to the buyer's premises) shall be whichever shall be less, namely :—

(i.) 2*d*. per imperial gal. higher than the maximum price chargeable in the district in which the establishment is situate for milk delivered to the buyer's premises on a sale by wholesale by a person other than a producer ; or

(ii.) The maximum retail price for the time being in force in such district.

(*b*) Any other sale to an establishment shall for the purposes of this Order be deemed to be a retail sale, and the maximum price shall be determined accordingly.

(*c*) "An establishment" for the purposes of this Order shall mean a public or private hospital, sanatorium, convalescent or nursing home, workhouse, infirmary, asylum, corporation, or company not established for purposes of trading or profit, a religious or charitable community, a residential school or college, and a canteen.

(*d*) A Food Committee shall have power with the consent of the Food Controller :—

(i.) to apply the provisions of this Clause whether with or without modifications to a sale of milk to any body of persons which, in the opinion of the Committee, should be treated as an establishment as defined ;

(ii.) to vary the provisions of this Clause in its application to any establishment.

7. *Small Wholesale Sales.*—Where a person who sells milk from a retail shop sells from such shop milk to a person buying for re-sale, the maximum price shall as to the milk so sold on any day be 2*d*. per gal. less than the maximum price applicable to sales of milk by retail in the area in which snch shop is situate, if the quantity sold on that day to such person does not exceed 8 imperial gallons.

Milk to be Sold Retail by Measure.—No milk shall be sold or offered for sale by retail otherwise than by imperial measure.

Additions of Colouring Matter Prohibited.—No colouring matter shall be added to milk or cream intended for sale, and no milk or cream to which any colouring matter has been added shall knowingly be sold, or offered or exposed for sale.

10. *Addition of Water Prohibited.*—No water shall be added to milk intended for sale, and no milk to which any water has been added shall knowingly be sold, or offered or exposed for sale.

11. *Cans and Bottles.*—No person may use for the purpose of his trade or business any milk can, milk churn or milk bottle which bears the name or trade name or the trade mark or trade device of some person other than himself or his employer, except with the consent of such person.

12. *Artificial Transaction.*—No person shall, in connection with the sale or disposition or proposed sale or disposition of any milk, enter or offer to enter into any fictitious or artificial transaction or make or demand any unreasonable charge.

13. *Powers of Food Committees.*—A Food Committee may, subject to the consent of the Food Controller,

(*a*) buy milk from any person and sell milk so bought at a price estimated to cover at least the cost of purchasing and distributing such milk; and

(*b*) make arrangements as to the distribution of milk in their area.

14. (*a*) A Food Committee may

(i.) direct any person delivering milk in their area to deliver such milk to any consumer or class of consumers in priority to any other person in their area; and

(ii.) direct any person selling milk by retail within their area to deliver in that area only with such parts thereof as the Committee may prescribe; and

(iii.) with the consent of the Food Controller give directions in their area for securing the purity, cleanliness and wholesomeness of milk, provided that any directions so given shall not relieve local authorities of their powers and duties under existing statutory provisions in regard to milk, or relieve cowkeepers, dairymen, purveyors of milk or occupiers of milk shops from their obligations under any such provisions.

(*b*) Every person to whom any direction is given under the powers conferred by this Clause shall comply with such directions.

16. *Contracts.*—Where any contract subsisting on the 1st April, 1918, for the sale of milk provides for the payment of a price in excess of the maximum price fixed by this Order applicable on the occasion of such a sale, the contract, unless otherwise determined by the Food Controller, shall be avoided so far as concerns milk which is to be delivered on or after that date.

17. The provisions of this Order relating to prices shall not apply to

(*a*) milk sold for consumption on the premises of the seller, or

(*b*) condensed milk, dried milk or milk preparations.

19. *Revocation.*—The Milk Order, 1917,* and the Price of Milk Order, No. 2, 1917, and the Milk (Amendment) Order, 1917, are hereby revoked as on the date when this Order comes into force, but without prejudice to any proceedings in respect of any previous contravention thereof.

The Order came into force on the 1st April, 1918, and extends only to Great Britain.

THE Food Controller, by an Order (No. 370), dated 25th March 1918, has made the following Amendment to the Principal Order, No 1186 of 1917:—†

Order Amending the Food Control Committees (Milk Requisition) Order, 1917.

1. Clause 2 of the Principal Order is hereby revoked and the following Clause is substituted:—

"2. A Food Committee shall agree to pay in respect of milk requisitioned under this Order the maximum price payable to a producer under any Order of the Food Controller for the time being in force and applicable to such producer."

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* See this *Journal* for September, 1917, p. 680.
† See this *Journal*, December, 1917, p. 1029.

THE Food Controller, by an Order (No. 386), dated 28th March, 1918, has made the following Amendment to the Principal Order, No. 1,105 of 1917*:—

Order Amending the British Cheese Order, 1917.

1. The Schedule to this Order shall be substituted for the Schedule to the Principal Order, which is hereby revoked.

2. The following Clauses shall be inserted after Clause 7 of the Principal Order:—

"7. A. The provisions of Clause 7 of this Order shall not apply in the case of cheese delivered by or on behalf of the maker thereof on or after the 1st April, 1918, and the following provisions shall have effect as regards such cheese:—

"(a) The maker of any cheese (other than cheese of the Caerphilly, Wensleydale, Stilton and 'Small Holder' types) shall cause the same to be indelibly marked immediately after it is made with the date of its manufacture.

"(b) No addition shall be made to the price of any such cheese to compensate for shrinkage.

"7. B. For the purposes of Clause 7 of this Order, no time after March 31st, 1918, shall be taken into account as part of a period of 14 days."

The Schedule.

Variety of Cheeses.	First-hand Prices for Delivery until 31st March, 1918, inclusive.
	s. d.
Wensleydale and similar makes ripened ..	1 7 per lb.
Stilton, ripened	1 7 "
Any whole milk cheese not exceeding 2 lb. weight, uncut	1 6 "
Caerphilly	129 0 per cwt. of 112 lb.
All other whole milk cheese	142 0 " "
Partially skimmed (British)	125 0 " "

B. FIRST-HAND PRICES FOR DELIVERY.

—	Between 1st April, 1918, and 30th April, 1918, inclusive.	On and after 1st May, 1918, until further notice.
	s. d.	s. d.
Caerphilly, whole milk	1 4½ per lb.	1 2 per lb.
" Partially skimmed	1 3 "	1 0½ "
" Wholly skimmed	1 1½ "	0 11 "

C. FIRST-HAND PRICES FOR DELIVERY.

—	Between 1st April, 1918, and 31st May, 1918, inclusive.	On and after 1st June, 1918, until further notice.
	s. d.	s. d.
Ripened Stilton and Wensleydale (blue) ..	1 7 per lb.	1 7 per lb.
Dorset, Hand skimmed blue	1 4½ ,,	1 2 ,,
,, Separated blue	1 3 ,,	1 0½ ,,
,, White	1 1½ ,,	0 11 ,,
All other whole milk cheese	1 6 ,,	1 3½ ,,
,, partially skimmed cheese	1 3 ,,	1 0½ ,,
,, wholly skimmed cheese	1 1½ ,,	0 11 ,,

In all cases prices are *ex* Factory or *ex* Farm.

All these prices are subject to the following terms :—

For cash within seven days—*2d.* in the £ discount.

,, ,, one month—*1d.* ,, ,,

AN Order, (No. 387) dated 28th March, 1918, has been made by the Food Controller to the following effect :—

The Sugar (Domestic Preserving) Order, 1918.

1. When any person receives any sugar issued by the Royal Commission on the Sugar Supply (hereinafter called the Sugar Commission) for the purpose of the preserving of fruit grown by the preserver, such person shall not dispose of or deal with such sugar so as to divert the same to any other purpose or use the same except for the purpose of preserving fruit grown by him.

2. On any sale of any such sugar the vendor shall on the invoice or package clearly state that the sugar may be used only for the preserving of fruit grown by the preserver.

3. Where the invoice relating to or the package containing any sugar bears a statement to the effect that the same may be used only for the preserving of fruit grown by the preserver the sugar shall be deemed to have been issued by the Sugar Commission for the purpose stated.

4. (*a*) No retailer shall sell or dispose of any sugar issued by the Sugar Commission for the purpose of the preserving of fruit grown by the preserver except to a person named in and to the amount authorised by a permit issued by or under the authority of the Food Controller or the Sugar Commission.

(*b*) Every retailer shall in respect of such sugar comply with such directions as the Food Controller or the Sugar Commission may give from time to time.

5. Any person who shall have acquired any such sugar and who for any cause is thereafter unable to use or fails to use the same for the purpose for which it was issued shall give notice of the fact forthwith to the Food Committee, and shall hold such sugar at the disposal of the Committee.

6. Every person dealing with any such sugar shall keep records of the persons to whom such sugar was supplied and of the quantities supplied to them and the dates upon which supplies were made, and such records shall at all times be open to the inspection of any person authorised by the Food Controller or the Food Committee.

7. A person shall not—

(*a*) Acquire or attempt to acquire or apply for any such sugar except for the purpose for which the same may be issued ;

(*b*) Make or connive at the making of any false statement on any application or declaration to be made in connection with such sugar ;

(*c*) Forge or alter any permit issued for the purposes of this Order ;

(*d*) Obtain or attempt to obtain any such sugar on a permit issued for the purposes of this Order where the application therefor contained a statement false in any material particular ;

(*e*) Fail to comply with any conditions subject to which any permit under this Order is granted to him ; or

(*f*) Personate or falsely represent himself to be a person to whom any such permit has been issued or applies.

Note.—This Order revokes the Sugar (Domestic Preserving) Order, 1917, and shall not apply to Ireland.

Sugar for Jam-Making.

FOR the purpose of the Sugar for Jam-making Distribution Scheme, 1918, "soft fruits" shall be taken to mean any fruits normally ready for preserving before the end of July, and in this category rhubarb may be included. "Hard fruits" shall be taken to mean any fruits ready for preserving after 31st July. Pumpkins and other vegetables are not to be included in either class, but marrows may be included at the discretion of the Food Control Committee in any district where these are usually preserved. (*National Food Journal*, 10th April, 1918.)

The Appointment of Arbitrators Order, 1918.

AN Order (No. 294), dated 11th March, 1918, has been made by the Food Controller to the effect that :—

1. Each of the Orders mentioned in the first column of the schedule is hereby amended by the substitution for the Clause of such Order mentioned in the second column of such Schedule of the following Clause :—

"The Arbitrator to determine in default of agreement the compensation to be paid for any article requisitioned under this Order shall be appointed by the Lord Chancellor of Great Britain in England, by the Lord President of the Court of Session in Scotland, and by the Lord Chief Justice of Ireland in Ireland."

2. Copies of the Orders mentioned in the Schedule hereafter to be printed under authority of His Majesty's Stationery Office shall be

printed with the substitutions provided for by this Order, and such Orders shall hereafter take effect as if they had been originally made with such substitutions.

SCHEDULE.

Title of Order. 1.	Clauses. 2.
The Barley (Requisition) Order, 1917	Clause 5.
The Cheese (Requisition) Order, 1917	Clause 4.
The Currants and Sultanas (Requisition) Order, 1917 ..	Clause 3.
The Milk Factories (Restriction) Order, 1917	Clause 10.
The Food Control Committees (Milk Requisition) Order, 1917	Clause 3.
The Seeds, Nuts and Kernels (Requisition) Order, 1917 ..	Clause 2b.
The Oils and Fats (Requisition) Order, 1917	Clause 2b
The Food Control Committees (Margarine Requisition). Order, 1917	Clause 3.

THE following Notice was issued by the Agricultural Wages Board on the 3rd April, 1918:—

The Committee of Inquiry on the Cost of Living for Farmers and Market Gardeners.

The Committee appointed by the Agricultural Wages Board to inquire into the financial results of farming and market-gardening and the cost of living as affecting rural workers, under present conditions, consists of six members of the Wages Board and three co-opted members. It is constituted as follows: Sir Henry Rew (*Chairman*), Sir W. J. Ashley, Mr. George Dallas, Mr. W. Gillies, Mr. F. Ivo Neame, Mr. C. S. Orwin, Mr. R. R. Robbins, Professor W. Somerville and Mr. R. B. Walker. Mr. A. W. Ashby and Captain Proby have been appointed joint secretaries to the Committee.

THE following Notice was published in March by the Government of the Commonwealth of Australia:—

Farming for Soldiers: Opportunities in Australia for British and Allied Troops.

Australia has wasted no time in the preparation of comprehensive land settlement schemes for soldiers. Within a few months of the outbreak of War, the problem of placing the men on suitable areas after their service ended was tackled by public men and the merits of various schemes inquired into. The Commonwealth Government intends to set aside a total of £32,000,000 for repatriation, and various State schemes are already in operation.

British soldiers and sailors will be interested in the scheme lately adopted by the Government of Queensland. Land comprising 234,300 areas has already been set aside, and negotiations are in progress for the resumption of other areas. Within the meaning of the "Discharged Soldiers Settlement Act," which deals with the subject, a "discharged soldier" not only includes members of the Australian Imperial Forces but any person who has joined the forces of the United Kingdom during the War and who has received an honourable discharge.

The terms may be extended so as to include members of His Majesty's forces during the present War from any part of the British Empire or

members of the allied forces who have received their discharge before their arrival in Queensland. The term also includes the dependants fo any such soldier, in the event of his death before he receives his discharge, or within a period of twelve months after he has received it.

Portions of the land set aside have already been cleared and planted, and a varied assortment of farming pursuits are recommended, such as pineapple growing, poultry raising, beekeeping, apple, pear, peach and plum orchards, dairy and sugar-cane farms. Liberal financial assistance will be given to settlers, particularly in the first years of their occupation.

Registration of the Names of Women Desirous of Taking Up Farm Work as a Profession.

THE following Letter (No. 102 L. 3), dated 20th March, 1918, has been addressed to Secretaries and Inspectors of the Women's Land Army by the Food Production Department of the Board :—

DEAR MADAM,—When an appeal was made by the Government last March for women to come forward and work on the land, certain benefits were offered in regard to training, outfit and maintenance. At the same time it was announced that selected members of the Women's Land Army who wish, after the war, to farm on their own account and to form themselves into groups for this purpose, will be separately registered, and every effort will be made to secure for them special facilities for settlement on the land either at home or in the Dominions overseas.

In order to be ready for any specific plan which may be formulated after the war, the names of women desiring to take up farm work as a profession should be recorded. I would ask you therefore to make a careful note of any woman who expresses a wish to farm either in Great Britain or overseas, with her name, address, age, length of training and experience, qualifications, character, and to send the same to this Department for future reference.

Even before the end of the war it is possible that some scheme may be arranged to help women in this direction. A register of suitable names would be of much service.

Yours faithfully,

MERIEL L. TALBOT,

Director, Women's Branch.

The Land Women and Billeting.

THE following Notice has been issued by the Food Production Department of the Board :—

In view of various statements in the Press, the Food Production Department wish it to be understood that the question of billets for the Women's Land Army is well in hand. Through the Women's Organisation set up in every county suitable billets are found for the Land Army girls imported into a given district.

The billets are inspected, the local rate of payment ascertained, and every care is taken to ensure the well-being of the land workers.

Should cases arise where the County Organisers find insuperable difficulty in obtaining suitable lodgings for the workers, the Department will be able to exercise compulsory powers under the Civilian

THE following Memorandum (No. 50 L. 1), dated 25th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Military Service Act, 1918.

In consequence of the passing of the above Act, fresh Regulations and Instructions (superseding all previous Regulations and Instructions), have been issued by the Local Government Board. Copies of these (R. 174 and R. 175), and of the covering letter (R. 173), are enclosed for your information.* Copies of the Act are not available for distribution.

So far as they affect men engaged in agriculture and allied trades, the alterations made in the Regulations and Instructions relate to the periods within which both unattested and attested men, whose certificates of exemption have ceased to be in force, may apply for the renewal of their exemptions.

Hitherto where a man's exemption had expired, an unattested man was entitled to apply for renewal before or within two weeks after the date on which his certificate ceased to be in force, and an attested man could apply for renewal within seven days of the date of the notice calling him up for service with the Colours.

Under the new Regulatious and Instructions these periods of grace still hold good in the cases of men whose certificates have ceased to be in force before the 11th March, 1918, but *as regards both unattested and attested men, whose certificates cease to be in force after the 11th March, 1918, and application for renewal may be made before or within seven days after the date on which the certificate ceases to be in force.*

VOL. LII., Part I, Agricultural Statistics, 1917, giving particulars of the Acreage and Livestock of England and Wales, with a Summary for the Uuited Kingdom, has just been published. Copies of the Return may be obtained from H.M. Stationery Office, price 3*d.* net., excluding postage.

Acreage and Live Stock Returns of England and Wales.

In the Summary to the Return, Sir Henry Rew shows that from June, 1914 to June, 1917, there has been an increase in the acreage of arable cultivation to the extent of 330,000 acres, while the acreage under wheat, barley and oats during this period has risen to nearly one million acres ; the greater part of this increase took place between June, 1915 and June, 1916. The area under wheat in 1917 was 1,918,485 acres, au increase of 6,277 acres on the 1916 area, barley 1,459,796 acres, an increase of 127,720 acres since 1916, and oats 2,258,909 acres, an increase of 174,235 acres since 1916. The announcement by the Government in February, 1917, of the guaranteed prices for wheat, oats and barley was too late in the season to affect the summer wheat crops, though probably the output of spring-sown crops was influenced by this offer.

In regard to permanent grass, the area during 1917 was 15,835,375 acres, or 187,608 acres less than in 1916. The total acreage under hay was 6,476,112 acres, a decrease of 112,575 acres on the 1916 area.

The other most noticeable features since 1914 are the increase in the area of potatoes by 170,000 acres, mainly in Ireland ; a decrease of nearly 11 per cent. in the area under beans ; an increase of 16 per

* Not here printed.

cent. in the area under potatoes ; a decrease by more than 50 per cent. of the hop cultivation ; and a reduction by nearly 600,000 acres of clovers and "seeds."

As regards live stock generally the numbers up to June, 1917, were well maintained except for pigs, which show a loss of nearly 1,000,000, the number returned, viz., 1,918,541, being the lowest since 1880. Horses and cattle show a slight increase, while in the case of sheep a decrease is shown.

THE following Letter (No. 47/L. 2), dated 28th March, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Parasitic Mange among Horses.

SIR,—Owing to the prevalence of parasitic mange among horses, particularly in certain counties, I am directed to remind you of the great importance of notifying promptly to the Board of Agriculture and Fisheries, 4, Whitehall Place, S.W. 1, every outbreak, whether in the case of horses belonging to the Food Production Department, or of those loaned by the Army ; such notification should in every case be in the form of the specimen attached.

In the case of horses loaned by the Army, the Horse Officer should be careful to ascertain whether notification of the outbreak has already been transmitted by the Local Authority to the Command Headquarters to which the horse belongs. Where this information has already been transmitted this fact should be stated by the Horse Officer, together with any particulars he may be able to obtain as the result of the investigation by the Army Authorities.

Where, on the other hand, no such information has been furnished by the Local Authority to the Command Headquarters, the Horse Officer should also be careful to state this fact, and to see that the address of the Headquarters is accurately set out in his report.

I am, etc.,
(Signed) JOHN L. HUNTER, *Captain*.
For Director of Labour.

THE following letter (No. A. 763), dated 5th April, 1918, has been addressed to Local Authorities by the Board :—

Sheep-Scab.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to refer to the Circular Letter addressed to Local Authorities by the Board on the 16th March, 1917 (A. 303/C), calling attention to the importance of securing the double-dipping of all sheep which have been in contact to sheep concerned in an outbreak of sheep-scab, by the service of Notices (Forms C and E) under the Sheep-Scab Order of 1910, and I am to say that it would be of assistance to the Board if they could be furnished with information in each case showing the dates upon which the sheep referred to in these Notices have actually been dipped. It would appear that the most convenient method of obtaining this information would be through the Inspector of the Local Authority in whose presence the dippings were carried out, and who would as a rule be the Inspector who serves the Notice (Form F) withdrawing the Notice (Form C), as he would necessarily have this information before him at the time. The President would be obliged, therefore, if your Local Authority would be good enough to issue

directions to their Inspectors to add to the copies of Notices (Form F) forwarded to the Board the dates on which the two dippings of the sheep referred to in the relative Notices (Forms C and E) were carried out.

I am also to take this opportunity of reminding your Local Authority of the request to Local Authorities contained in the Board's Circular Letter of the 15th July, 1912 (A 211/C), to arrange that the name and address of the person on whom the Detention Notice (Form A) has been served under Article 2 of the Sheep-Scab Order of 1905 should be given *on each copy of the Notice (Form C, E and F) in addition to the name* and address of the person on whom the latter Notice is served. In many cases it is observed that this request is not complied with, and the Board would be glad if your Local Authority, in issuing the directions desired in the first paragraph of this letter, would at the same time add an *instruction to meet their request under this head also.*

I am, etc.,
(Signed) A. D. HALL,
Secretary.

Importation of Plants and Certain Seeds into British India.

THE Department of Agriculture of the Goverment of India have, under the Destructive Insects and Pests Act, 1914, placed the following restrictions on the importation of certain plants and seeds into British India :—

(1) No plant may be imported into British India by means of letter or sample post.

(2) No plants except fruits and vegetables intended for consumption, no potatoes and no sugar cane may be imported into British India by sea except after fumigation with hydrocyanic acid at one of the following "prescribed ports"—Bombay, Calcutta, Dhaneshkhodi, Karachi, Madras, Negapatam, Tuticorin and Rangoon.

This provision does not apply to plants imported under the special certificate of the Imperial Entomologist to the Government of India for experimental purposes.

(3) Potatoes imported into British India must be accompanied by a certificate from the consignor declaring the district and county of origin, and guaranteeing that no Wart Disease is known to exist on the land where the potatoes were grown ; also by an official certificate that no case of Wart Disease of potatoes has been known to exist during the previous twelve months within five miles of the place of where the potatoes were grown. In the United Kingdom, the proper officer or authority for the issue of this certificate is the Board of Agriculture and Fisheries for England or the Board of Agriculture for Scotland ; and the Department of Agriculture and Technical Instruction for Ireland.

Importation of Plants into Calcutta.

THE following Rules for the disinfection of plants imported by sea into Calcutta have been issued by the Governor of Bengal in Council under the Destructive Insects and Pests Act, of 1914.

(1) It shall be the duty of the Customs staff to conduct the operation of disinfection of plants on their entry at the port of Calcutta.

(2) The fumigation of such plants by hydrocyanic acid gas shall be in accordance with the instructions received from the Imperial Entomologist, Pusa.

An Act to Regulate the Sale of Fungicides, etc., in Australia.

AN Act entitled the Fungicides Act of 1916, regulating the sale of fungicides, insecticides and vermin and weed destroyers was passed by the Legislature of the Government of the Commonwealth of Australia in November, 1916, and contains the following main provisions:—

(1) The Governor-General in Council may by proclamation fix the standards as to the constituents of which any fungicide, insecticide, vermin destroyer or weed destroyer can be composed; and no one shall sell any article which is not in accordance with the standard so fixed and declared; otherwise he shall be deemed to have committed an offence under this Act.

(2) Every package containing any fungicide, insecticide, or vermin and weed destroyer must show a full statement of the component parts of its contents, and at the time of sale the seller must give the buyer an invoice or statement, containing the trade name or description of the article sold, and its component parts, with the percentage standard strength of each; and such invoice or statement shall operate as a warranty by the vendor of the accuracy of the facts therein stated.

The Act also provides, among other things, for the appointment of inspectors and the testing of samples of sales of fungicides, etc.

Maximum Retail and Wholesale Prices.

THE following is a list of Retail and Wholesale Maximum Prices of certain agricultural commodities fixed by the Food Controller (extracted from recent issues of the *National Food Journal*):—

RETAIL MAXIMUM PRICES.

Bacon and Ham—

Over actual cost to retailer	3*d*. per lb.

The profit may be averaged when a side of bacon is cut.

Beans, Coloured Haricot	5½*d*. per lb.
,, White Haricot	6*d*. ,,
,, Large Butter	8*d*. ,,
,, Japanese Diafuku	8*d*. ,,

Butter, a rate not exceeding actual cost as defined by the Order to the retailer by	2½*d*. per lb.
A charge may be made for credit and delivery, otherwise than by post or rail, not exceeding	½*d*. ,,
Government Butter	2*s*. 6*d*. ,,

Cheese, an addition to actual cost to the retailer as defined by the Order, not exceeding	2½*d*. per lb.
(This price includes delivery and credit charges to the customer.)	
Government Cheese	1*s*. 4*d*. ,,

Damaged Grain, Seeds, and Pulse—

For quantities not exceeding 7½ qr., add to wholesale prices	4*s*. per 480 lb.
For quantities of less than half a qr.	8*s*. ,,

Potatoes: Ware—

Sold by grower, quantities less than 1 cwt. .. .. 1*d*. per lb.
Sold by retailer, the following scale :—

Retailer's Buying Price per cwt. for Potatoes Delivered at the Place at which he usually Takes Delivery.	Highest Authorised Retail Selling Price over the Counter. Per Stone of 14 lb. for Lots of 14 lb. or more.	Per Half Stone for Lots of 7lb. or more, but less than 14 lb.	Per lb. for Lots of less than Half Stone.
	s. d.	*s. d.*	*s. d.*
Any price up to and including 3*s*. 3*d*.	0 7	0 3½	0 0½
Exceeding—			
3*s*. 3*d*. but not exceeding 3*s*. 7*d*.	0 7½	0 4	
3*s*. 7*d*. ,, ,, 3*s*. 11*d*.	0 8		
3*s*. 11*d*. ,, ,, 4*s*. 2*d*.	0 8½	0 4½	0 0¾
4*s*. 2*d*. ,, ,, 4*s*. 6*d*.	0 9		
4*s*. 6*d*. ,, ,, 4*s*. 9*d*.	0 9½	0 5	
4*s*. 9*d*. ,, ,, 5*s*. 1*d*.	0 10		
5*s*. 1*d*. ,, ,, 5*s*. 4*d*.	0 10½	0 5½	
5*s*. 4*d*. ,, ,, 5*s*. 8*d*.	0 11		
5*s*. 8*d*. ,, ,, 5*s*. 11*d*.	0 11½	0 6	
5*s*. 11*d*. ,, ,, 6*s*. 3*d*.	1 0		0 1
6*s*. 3*d*. ,, ,, 6*s*. 7*d*.	1 0½	0 6½	
6*s*. 7*d*. ,, ,, 6*s*. 11*d*.	1 1		
6*s*. 11*d*. ,, ,, 7*s*. 2*d*.	1 1½	0 7	
7*s*. 2*d*. ,, ,, 7*s*. 6*d*.	1 2		
7*s*. 6*d*. ,, ,, 7*s*. 10*d*.	1 2½	0 7½	
7*s*. 10*d*. ,, ,, 8*s*. 1*d*.	1 3		
8*s*. 1*d*. ,, ,, 8*s*. 5*d*.	1 3½	0 8	
8*s*. 5*d*. ,, ,, 8*s*. 8*d*.	1 4		0 1¼
8*s*. 8*d*. ,, ,, 9*s*. 0*d*.	1 4½	0 8½	
9*s*. 0*d*. ,, ,, ..	1 5		

Potatoes: Seed—

Variety of Potato.	Highest Authorised Selling Price per Stone. Class I. (Grown in Scotland or Ireland in 1917).	Class II. (Once Grown in England or Wales).	Class III. (Twice Grown in England or Wales).
	s. d.	*s. d.*	*s. d.*
Myatt's Ashleaf Kidney ..	4 0	3 6	3 3
Edzell Blue			
Early Puritan	3 6	3 0	2 6
Duke of York			
Sharpe's Express			
Eclipse			
May Queen			
Midlothian Early			
Sir John Llewelyn			
Ninetyfold	3 0	2 9	2 3
Beauty of Hebron			
Early Rose			
Epicure	2 6	2 3	2 0

(*Note*.—For the above-mentioned varieties, the wholesale prices are le[ft] free within the maximum prices shown above.)

For varieties other than those above mentioned—

(*a*) Sold by grower to actual planter in quantities of 1 cwt. or less .. .. 1*s.* 3*d.* per stone.

(*b*) Sold by registered dealer retail in seed potatoes—
(i.) In quantities of more than 1 ton of any one variety, price not to exceed cost to retailer by more than £1 per ton.
(ii.) In quantities of 1 ton or less, but more than 1 cwt. of any one variety, price not to exceed cost to retailer by more than .. .. .. £2 5*s.* per ton.
(iii.) In quantities of 1 cwt. or less or any one variety the following scale :—

Retailer's Buying Price per cwt. at Place at which he Ordinarily Takes Delivery.	*Highest Retail Selling Price for Lots of 1 Cwt. or less of any One Variety. Per Stone.* s. d.
Up to and including 5*s.* 6*d.*	1 0
Exceeding—	
5*s.* 6*d.* but not exceeding 6*s.*	1 1
6*s.* 0*d.* ,, ,, 6*s.* 6*d.*	1 2
6*s.* 6*d.* ,, ,, 7*s.* 0*d.*	1 3
7*s.* 0*d.* ,, ,, 7*s.* 6*d.*	1 4
7*s.* 6*d.* ,, ,, 8*s.* 0*d.*	1 5
8*s.* 0*d.* ,, ,, 8*s.* 6*d.*	1 6
8*s.* 6*d.* ,, ,, 9*s.* 0*d.*	1 7
9*s.* 0*d.* ,, ,, 9*s.* 6*d.*	1 8
9*s.* 6*d.* ,, ,, 10*s.* 0*d.*	1 9
10*s.* 0*d.* ,, ,, 10*s.* 6*d.*	1 10
10*s.* 6*d.* ,, ,, 11*s.* 0*d.*	1 11
11*s.* 0*d.* ,, ,, 11*s.* 6*d.*	2 0
11*s.* 6*d.* ,, ,, 12*s.* 0*d.*	2 1
12*s.* 0*d.* ,, ,, 12*s.* 6*d.*	2 2
12*s.* 6*d.* ,, ,, 13*s.* 0*d.*	2 3
13*s.* 0*d.* ,, ,, 13*s.* 6*d.*	2 4
13*s.* 6*d.* ,, ,, 14*s.* 0*d.*	2 5
14*s.* 0*d.*	2 6

For lots of less than one stone the rate per stone may be charged and the price levelled up to the nearest penny.

An extra charge may be made by the retail dealer if he delivers the seed potatoes to his customers' premises.

Onions .. .. 3*d.* per lb.

Poultry Mixtures or Horse Corn Mixtures—

Profits permitted on cost price :—
More than 6 cwt. .. .. 1*s.* per cwt.
Less than 6 cwt. and not less than 3 cwt. .. 3*s.* ,,
Less than 3 cwt. and not less than ½ cwt. .. 4*s.* ,,
Less than ½ cwt. .. .. ½*d.* per lb.

Horse Chaff Mixtures—

1 ton or more .. .. 1*s.* per cwt.
Less than 1 ton and not less than 5 cwt. .. 2*s.* ,,
Less than 5 cwt. and not less than ½ cwt. .. 3*s.* ,,
Less than ½ cwt. .. .. 1*s.* per 14 lb.

Rabbits, Wild—

Including pelt or skin .. .. 2*s.*
Without the skin .. .. 1*s.* 9*d.*
For part, skinned and cleaned .. .. .. 10*d.* per lb.

WHOLESALE MAXIMUM PRICES.

Damaged Grain, Seeds, and Pulse—

Imported feed wheat	72*s*. per 480 lb.
Damaged imported wheat	65*s*. ,, ,,
Damaged imported rye	65*s*. ,, ,,
Damaged imported maize	65*s*. ,, ,,
Damaged imported and home-grown pulse and seeds (other than oil seeds) used for feeding purposes	65*s*. ,, ,,
Damaged imported barley	55*s*. ,, 448 lb.
Damaged imported oats	41*s*. ,, 336 ,,

Home-Grown of 1917 crop—

Date of Delivery.	Wheat and Rye, per qr. of 504 lb	Oats, per qr. of 336 lb.	Barley, per qr. of 448 lb.
	s d.	*s d.*	*s. d.*
January, 1918	74 6	45 3	62 9
February or March, 1918	75 6	46 3	62 9
April or May, 1918	76 9	47 3	62 9
On or after 1st June, 1918	77 9	48 6	62 9

Oats, for human food	*add* 3*s*. per qr.
Barley, bought for manufacturing purposes under licence (not by a flour miller)	*add* 5*s*. 3*d*. per qr.
Wheat and Rye, unfit for milling, or tailings and dressings	*deduct* 7*s*. per qr.
Barley, unfit for milling, or tailings and dressings	*deduct* 7*s*. 9*d*. per qr.
Oats, improperly cleaned, or tailings and dressings..	*deduct* 5*s*. per qr.
Grain, bought by flour miller from recognised dealer, not producer	*add* 1*s*. per qr.
Grain, bought by non-miller from recognised dealer, not producer	*add* 2*s*. to 8*s*. per qr.

Milk (Summer Prices)—

PRODUCERS' PRICES.

	Per Imp. Gal. England and Wales.	Scotland.
	s. d.	*s. d.*
April	1 8	1 8
May	1 0	1 2
June	1 0	1 0
July	1 2	1 0
August	1 3	1 2
September	1 3	1 4

WHOLESALE DEALERS' PRICES.

England, Wales and Scotland, Per. Imp. Gal.

	Delivery to Buyer's Railway Station.*	Delivery to Buyer's Premises.
	s. d.	*s. d.*
April	1 10	2 0½
May	1 2	1 4½
June	1 2	1 4½
July	1 2	1 4½
August	1 6	1 8½
September	1 6	1 8½

* In addition to Railway charges paid by the seller for transport from the seller's station to buyer's station.

(These prices do not apply to Ireland.)

Cattle Foods—

	Per ton. £	s.	d.
Home Manufactured Cakes and Meals—			
Linseed cake containing not less than 8 per cent. oil	19	0	0
Cotton seed cake	14	10	0
Undecorticated ground nut cake	17	5	0
Semi-decorticated ground nut cake	18	2	6
Decorticated ground nut cake	19	0	0
Palm kernel cake	13	15	0
Rape cake	14	0	0
Copra cake	16	5	0
Sesame cake	18	10	0
Soya cake	19	0	0
Extracted palm kernel meal	13	10	0
Extracted rape meal	14	0	0
Extracted soya meal	18	15	0
Imported Cakes and Meals—			
North American linseed cake	19	5	0
Argentine linseed cake	19	15	0
Canadian linseed cake	19	10	0
Australian linseed cake	19	10	0
Spanish and Portuguese linseed cake	19	10	0
Egyptian cotton seed cake	15	0	0
Decorticated cotton seed meal	19	15	0
Decorticated cotton seed cake	19	15	0
Repressed cotton cake	20	15	0
Semi-decorticated cotton cake	17	10	0
Copra cake	17	10	0
Palm kernel cake	15	0	0
Rangoon rice meal	16	10	0
Italian rice meal	14	10	0
Canadian rice meal	17	0	0
Egyptian rice meal	17	0	0
Gluten feed	17	5	0
Maize meal cake	17	5	0
Compound Cakes and Meals (made from two or more ingredients when no oil is expressed in the process of manufacture)—			
Cakes and meals containing not less than 7 per cent. oil and not less than 20 per cent. albuminoids	17	5	0
Cakes and meals containing not less than 6 per cent. oil and not less than 20 per cent. albuminoids	17	0	0
Cakes and meals containing not less than 6 per cent. oil and not less than 17 per cent. albuminoids	16	17	6
Millers' Offals—			
Flour millers' offals of all kinds	13	0	0
Fine barley dust	17	0	0
Coarse barley dust	8	0	0
Oat dust	6	0	0
Oat husks	3	0	0
Oat husk meal	5	0	0
Miscellaneous—			
Malt culms	13	5	0
Kiln dust	11	0	0
Dried distillers' grains	15	5	0
Dried brewers' ale grains	14	5	0
Dried brewers' porter and mixed grains	14	0	0

	Per usual trade quarter. £	s.	d.
Wet brewers' ale and distillers' grains for October—April delivery	0	8	4
Wet brewers' porter and mixed grains for October—April delivery	0	7	10
Wet brewers' ale and distillers' grains for May—September delivery	0	7	4
Wet brewers' porter and mixed grains for May—September delivery	0	6	10

Cattle Grading—

BULLS, BULLOCKS AND HEIFERS

		Per cwt.
1st Grade,	56 per cent. and over	75*s*.
2nd ,,	52 per cent. to 56 per cent.	70*s*.
3rd ,,	48 per cent. to 52 per cent.	65*s*.
4th ,,	under 48 per cent.	As valued.

COWS.

		Per cwt.
1st Grade,	52 per cent. and over	70*s*.
2nd ,,	46 per cent. up to 52 per cent.	62*s*.
3rd ,,	42 per cent. up to 46 per cent.	53*s*.
4th ,,	under 42 per cent.	As valued.

Cheese, British made, *ex* factory or farm (first-hand prices)—

Wensleydale and similar makes, ripened	1*s*. 7*d*. per lb.
Stilton, ripened	1*s*. 7*d*. ,,
Any whole-milk cheese not exceeding 2 lb. weight uncut	1*s*. 6*d*. ,,
Caerphilly	129*s*. per cwt.
All other whole-milk cheese	142*s*. ,,
Partially skimmed (British)	125*s*. ,,

Hundredweight, 112 lb

For permitted additions to wholesalers, see the Order.

Dutch, first-hand prices to importers—

Full cream Cheddar shapes	160*s*.	per cwt.
Half meat Cheddar shapes	140*s*.	,,
Gouda, 45 per cent.	153*s*.	,,
,, 40 ,, ...	146*s*.	,,
,, 30 ,, ...	139*s*. 6*d*.	,,
,, 20 ,, ...	129*s*. 6*d*.	,,
Edam, 45 ,, ...	155*s*.	,,
,, 40 ,, ...	148*s*.	,,
,, 30 ,, ...	141*s*.	,,
,, 20 ,, ...	131*s*.	,,

[All the above are *ex* port.]

Horse Mixtures and Poultry Mixtures—

Profits permitted on cost price .. .. .. 30*s*. per ton.

Milk, Producers' price (railway transport charges extra)—

March	1*s*. 9*d*. per imp. gal.
Wholesale dealers' price	2*s*. 0*d*. ,, ,,

These prices do not apply to Ireland.

Onions, British—

If sold by grower	£15 per ton.
If sold other than by grower	£19 ,,

Pigs—

Live weight	21*s*. per 20 lb.
Dead weight (offals included)	28*s*. ,,

(No pig may be sold for slaughter weighing less than 112 lb. live weight.)

Potatoes, Ware—

Maximum growers' price, f.o.r.	£6 10*s*. per ton.
Wholesalers' prices : average profit during any week not to exceed	7*s*. 6*d*. ,,

Potatoes, Seed—

(*a*) *Maximum Growers' Price* : In accordance with the following Schedule—

Variety of Potato.	Maximum Growers' Price, free on rail. Class I. (Grown in Scotland and Ireland in 1917).	Class II. (Once Grown in England and Wales).	Class III. (Twice Grown in England and Wales).
	£ s. d.	£ s. d.	£ s. d.
King George V.			
Great Scot			
Lochar	9 0 0	7 10 0	7 0 0
Templar			
Royal Kidney			
British Queen			
Pioneer	7 10 0	6 15 0	6 10 0
Queen Mary			
Evergood	7 5 0	6 10 0	6 10 0
King Edward VII.			
Arran Chief			
Langworthy			
What's Wanted			
Golden Wonder			
Irish Queen	7 0 0	6 10 0	6 10 0
Shamrock			
Abundance			
President			
Iron Duke			
Scottish Farmer			
Any other varieties not specified in either this list or the list of varieties named with retail prices, and not sold under licence	6 15 0	6 10 0	6 10 0

Prosecutions of Farmers under Statutory Rules and Orders.

Aberdare.—Evan Walters, cattle dealer, on sales of meat, £150 with £31 10*s.* costs. Nine summonses held over pending appeal.

Nottingham.—William Henry Mitchell, Bobbers Mill, on sales of milk with 48 per cent. added water and a 33 per cent. deficiency of fat, £25.

Stroud. — The Stroud Co-operative Society, on sales of margarine as butter, £15 5*s.*, including costs.

Thames.—Four and three months' hard labour were the sentences pronounced on Lewis and Simon Marcus, Cecil Street, Mile End, for watering milk. Within a year the former had paid £100 in fines for this offence.—John McGown, Goldsmiths' Row, Shoreditch, on sales of milk with 90 per cent. deficiency of fat, £20.—Michael Samuels, Hoxton Street, on a similar offence, £10.

Great Missenden.—For letting a stack of wheat be damaged Alexander Axarlis, shipper, Guildford, was fined £50 and costs, and his bailiff,

Stowmarket.—For milling wheat and barley contrary to the Flour and Bread Order (No. 2), 1917, and for failing to make returns, F. R. Cook and Co., Stow-Upland, were find £45 with 9 guineas costs.

Wakefield.—Having bought two cows otherwise than through a market, William Taylor, Smithies, Barnsley, was fined £40; and a similar penalty was imposed upon Fred Brooke, Alverthorpe, the purchasing dealer.

Rugeley.—John Ashmore, farmer, Hamstall Ridware, on sales of adulterated milk, £25 and 4 gs. costs.

South-Western.—Messrs. Aplin and Barrett, and the Western Counties Creameries, Ltd., on sales of butter, £15, with 5 gs. costs.

Milford Haven.—Fined £50 for selling milk with 55 per cent. of added water, John Davies, Thornton Dairy Farm, was also sentenced to three months' hard labour. He had carried some churns containing water only.

Lutterworth.—For feeding horses with barley, Rowland Nichols, farmer, Swinford, was fined £20, with costs. (*The National Food Journal*, 27th March and 10th April, 1918.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for March, 1918, issued by the International Institute of Agriculture, contains estimates of the production of cereal crops in the Northern Hemisphere. The countries in respect of which it is possible to give forecasts are as follows:—In *Europe*—Denmark, Spain, France, Great Britain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland; in *America*—Canada, United States; in *Asia*—British India, Japan; in *Africa*—Algeria, Egypt, Tunis.

Wheat.—The total production in the above-mentioned countries is estimated to amount to 234,094,000 qr. in 1917, against 242,173,000 qr. in 1916, a decrease of 3·3 per cent., while the area sown was smaller by 5·8 per cent.

Rye.—In the above-mentioned countries in Europe and America, except Great Britain, the yield is placed at 18,704,000 qr. in 1917, against 19,396,000 qr. in 1916, a decrease of 3·6 per cent., but the area sown was larger by 7·1 per cent.

Barley.—The production in the specified countries, excluding British India, is estimated at 76,094,000 qr. in 1917, against 73,122,000 qr. in 1916, or an increase of 4·1 per cent., the area sown being greater by 5·3 per cent.

Oats.—The total yield in the specified countries, with the exception of British India and Egypt, is placed at 281,578,000 qr. in 1917, or an increase of 12·4 per cent. compared with 1916, when it amounted to 250,502,000 qr., while the area sown showed an increase of 6·8 per cent.

Maize.—The total production in Spain, France, Italy, Switzerland, Canada, United States and Japan is estimated to amount to 385,286,000 qr. in 1917, against 317,312,000 qr. in 1916, an increase of 21·4 per cent., the area sown being greater by 12·4 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The areas estimated to have been sown with winter *wheat* in 1917-18, compared

with the areas sown during the corresponding period of 1916-17, expressed as percentages, are as follows :—Denmark, 102, Spain 95, France 107, England and Wales 115, Scotland 122, Luxemburg 105, Canada 96, United States 105, British India 110, Japan 118, Tunis 113; with *rye* :—Denmark 118, Spain 108, France 96, England and Wales 103, Luxemburg 95, United States 145; with *barley* :—Spain 100, France 92, England and Wales 100, Japan 99, Tunis 111; with *oats* :—Spain 115, France 106, England and Wales 100, Tunis 120.

France.—According to a report published by the Ministry of Agriculture on 22nd March, the condition of the crops was as follows (figures for March, 1917, in brackets) :—Winter wheat, 72 (59); winter barley, 71 (60); winter oats, 71 (57); and rye, 73 (64). (80 = good, 60 = fairly good, 50 = passable.) (*Broomhall's Corn Trade News*, 23rd March, 1918.)

Canada.—According to a report, dated 5th April, received from the High Commissioner for Canada, the weather conditions in Western Canada are very favourable for sowing and preparation of the land, and this work is stated to be three weeks in advance of last year. It is estimated that over 12,000,000 bush. of wheat still remain in farmers' hands in Western Canada.

United States.—According to the official report issued on the 4th April, the autumn-sown wheat crop has practically everywhere improved during March owing to the favourable weather which has generally prevailed. (*Broomhall's Corn Trade News*, 5th April, 1918.)

According to a report issued on the 8th April by the Statistician of the Department of Agriculture, the average condition of winter wheat and rye in the United States on the 1st April was estimated as follows :—Wheat, 78·6 per cent., compared with 79·6 per cent. in December last, and 63·4 per cent. a year ago; and rye, 85·8 per cent., compared with 84·1 per cent. in December and 86·0 per cent. a year ago. The area is estimated as follows :—Wheat, 42,170,000 acres compared with 40,534,000 acres last year; and rye, 6,119,000 acres compared with 4,480,000 acres; whilst from present appearances the yield of wheat is forecasted at 560,000,000 bush. against 418,000,000 bush. last year, and rye at 86,000,000 bush. compared with 60,000,000 bush. (*Broomhall's Corn Trade News*, 8th April, 1918.)

India.—According to the second general forecast issued on 15th March, the total area sown with wheat is 34,469,000 acres compared with 32,940,000 acres, the final estimate of last year. The second official forecast of the linseed acreage is 2,932,000 acres which compares with 2,858,000 acres the final estimate in 1916-17. (*Broomhall's Corn Trade News*, 18th and 21st March, 1918.)

Australia.—The total production of the wheat crop of the Commonwealth for 1917-18 is estimated at 121,679,153 bush. as compared with an actual yield of 152,565,689 bush. in 1916-17. Each of the States, with the exception of New South Wales and Tasmania, shows a diminished yield this season. (*Broomhall's Corn Trade News*, 4th April, 1918.)

According to reports from the Weather Observers of the Commonwealth Meteorology Department, the weather of December was general fairly favourable to agriculture. The yield of wheat appears to be only fair on the whole, and in some districts damage by rust is reported. Grass was as a rule plentiful, and live stock are generally in good condition.

Agricultural Conditions in England and Wales on 1st April.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales, state that the weather of March was everywhere most favourable for all farming operations.

Wheat is generally very satisfactory, being strong and healthy, and quite promising, although here and there the plant is occasionally thin, and a certain number of reports refer to damage by wireworm on newly-ploughed grass land. Other autumn-sown crops are also quite satisfactory.

Cultivation of the land for spring crops proceeded without interruption, the land working well; and much of the spring corn has now been sown under very favourable conditions. The early-sown crops have germinated satisfactorily. In the chief potato districts of the Fens and Lancashire, planting of this crop is in full swing. Elsewhere, some early potatoes only have been got in, and, generally speaking, the land is being rapidly prepared, but only a beginning has been made with the main crop. Work generally is very well forward for the time of year.

Seeds are generally healthy and vigorous, giving promise of a good crop; still, however, with the exception of the east and north-east of the country, where they are patchy, but here also there has been some improvement during the month.

Lambing has been general all over the country. The condition of the ewes is nearly everywhere described as only fairly good, owing to the shortage of artificial food; but the fall of lambs is everywhere satisfactory, and often good. The lambs themselves are reported as strong, and with the unusually favourable weather there has been little mortality, either among the ewes or lambs.

The supply of labour, especially skilled kinds, is still short, but with the assistance of soldiers, women, and German prisoners in many places, and with the very favourable weather allowing work to be continued throughout the month without a break, the situation has been much relieved, and, as mentioned above, work is well forward. In most parts of the country there was a general rise of wages at Lady-day.

Agricultural Labour in England and Wales during March.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Northumberland, Durham, Cumberland, and Westmorland.—The supply of labour is deficient, but owing to the fine March, work is well advanced.

Lancashire and Cheshire.—The supply of labour is deficient in most districts, and the scarcity will be more felt when potato-planting is general, but the fine weather has allowed work to get well forward.

Yorkshire.—The supply of skilled labour remains deficient. Soldiers and women have been of great assistance, and the position is generally better than expected. Temporary labour for special work is still difficult to obtain.

Shropshire and Stafford.—The supply of labour is very short, especially of casual labour, but, with the assistance of the military and women, and the very favourable weather during the month, work has been kept well forward.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is generally insufficient for the amount of work to be done, and it is anticipated that the shortage will be more keenly felt within the next few weeks. Soldiers, women, and German prisoners have done good work.

Lincoln and Norfolk.—The supply of labour is generally rather deficient. Casual labour is very scarce, but it is expected that women and soldiers will do most of the potato planting. Wages have been increased by 5*s.* a week in many districts.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is still deficient in most districts, but the favourable weather has allowed farmers to get well ahead with the spring work.

Bedford, Northampton, and Warwick.—The supply of labour is deficient in certain districts, but, with the assistance of soldiers and women, the supply is elsewhere about sufficient for present needs. Carters are scarce, and wages in some places have gone up.

Buckingham, Oxford, and Berkshire.—Though skilled labour is deficient work is not backward, soldiers and women having done much to make up the deficiency.

Worcester, Hereford, and Gloucester.—The labour supply is generally deficient, especially as regards skilled men. Soldiers, women, and boys have been of great assistance, and work is fairly well in hand. Casual labour is almost unobtainable.

Cornwall, Devon, and Somerset.—The labour supply is everywhere very short, and, even with the assistance of soldiers, women, and German prisoners, farmers have difficulty in getting sufficient. Wages were increased by 3*s.* to 5*s.* per week at Lady-day in some districts, and there appears to be a general tendency in that direction.

Dorset, Wiltshire, and Hampshire.—The supply of labour, particularly skilled labour, is short, but much assistance has been given by women as well as soldiers.

Surrey, Kent, and Sussex.—The supply of skilled labour is short, but, with the assistance of women and soldiers, and favoured by the fine weather, farmers have been able to cope with the work. Wages tend to increase.

Essex, Hertford, and Middlesex.—Though the supply of labour is deficient, the shortage does not appear serious. Soldiers, women, and German prisoners have rendered good assistance.

North Wales.—Labour remains very short everywhere, but the favourable weather has somewhat eased the position by allowing work on the land to be continued through the month without a break. Casual labour is difficult to get in most districts.

Mid Wales.—Labour is everywhere very short, particularly as regards skilled workers. The help of soldiers and women, together with the exceptionally favourable weather has somewhat improved the position.

South Wales.—The supply of labour continues deficient. The favourable weather and the help of soldiers have somewhat eased the position, but casual labour, which will be needed for potato planting,

THE following statement shows that according to the information in the possession of the Board on 1st April, 1918, certain diseases of animals existed in the countries specified :—

Prevalence of Animal Diseases on the Continent.

Austria (on 6th March).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of January).—Anthrax, Foot-and-Mouth Disease, Swine Erysipelas.

France (for the period 17th February—2nd March).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas. Swine Fever.

Germany (for the period 15th—28th February).—Foot-and-Mouth Disease, Glanders and Farcy, Swine Fever.

Holland (month of February).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 6th March).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 25th February—3rd March).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,893 outbreaks), Rabies, Sheep-scab, Swine Fever, Tuberculosis.

Norway (month of January).—Anthrax.

Sweden (month of February).—Anthrax, Swine Fever.

Switzerland (for the period 18th—24th February).—Anthrax, Sheep-scab, Swine Fever.

No further returns have been received in respect of the following countries : Belgium, Bulgaria, Montenegro, Rumania, Russia, Serbia, Spain.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of March, 1916, 1917, and 1918.

—	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	57	0	81	2	73	7	53	11	66	1	56	2	32	8	52	3	52	7
Norwich ...	56	3	78	2	72	3	55	2	63	3	56	8	31	3	49	2	47	6
Peterborough	55	5	79	0	71	10	53	8	64	0	56	7	31	3	49	4	49	6
Lincoln ...	57	5	81	1	71	11	54	0	65	1	56	10	31	9	50	1	54	7
Doncaster ...	57	9	79	7	71	11	52	9	65	4	56	4	31	5	49	11	46	0
Salisbury ...	56	11	78	7	71	7	53	8	64	6	57	7	31	0	48	8	50	11

STATEMENT showing the Average Price of **British Corn, per Quarter (Imperial Measure)**, for the Quarter ending **Lady Day**, 1918, pursuant to the Corn Returns Act, 1882.

Wheat.	*Barley.*	*Oats.*
s. d.	*s. d.*	*s. d.*

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.			BARLEY.			OATS.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 5 ...	55 8	76 0	71 2	47 8	66 4	58 0	31 5	47 1	45 5
" 12 ...	56 7	75 8	71 2	48 6	65 7	58 2	31 11	47 2	46 9
" 19 ...	57 2	75 8	71 3	49 6	64 9	58 1	32 6	47 4	47 9
" 26 ...	58 0	75 10	71 1	51 0	64 5	58 7	32 11	47 8	48 2
Feb. 2 ...	58 3	75 10	71 2	52 5	64 0	58 10	32 4	47 3	50 2
" 9 ...	57 6	76 0	72 0	52 10	63 5	59 0	32 2	46 11	50 6
" 16 ...	56 11	76 3	72 3	53 6	63 8	58 11	31 9	47 3	52 0
" 23 ...	58 2	76 9	72 2	54 2	63 9	58 9	32 2	47 8	52 3
Mar. 2 ...	59 4	77 4	72 2	55 7	64 0	57 9	32 4	48 0	52 0
" 9 ...	58 2	78 0	72 3	55 6	63 7	58 5	32 3	48 7	52 2
" 16 ...	57 9	78 10	72 4	55 4	64 1	56 10	31 10	49 4	51 0
" 23 ...	55 11	80 3	72 3	54 6	65 6	56 9	31 4	50 4	50 3
" 30 ...	53 6	81 5	72 4	53 8	71 10	56 7	30 5	51 10	48 10
Apl. 6 ...	51 8	84 4	72 11	53 7	69 11	56 7	30 1	55 1	49 10
" 13 ...	53 2	85 2	73 3	53 1	71 10	56 6	30 7	57 2	47 2
" 20 ...	55 3	84 10		52 10	70 6		31 8	59 8	
" 27 ...	56 3	81 1		53 5	69 5		32 4	58 6	
May 4 ...	55 7	77 7		53 1	64 4		32 10	54 9	
" 11 ...	55 5	78 0		53 5	64 11		33 1	55 2	
" 18 ...	55 0	77 11		52 10	64 10		33 0	55 2	
" 25 ...	54 7	78 0		52 9	64 9		33 4	54 11	
June 1 ...	53 3	78 0		53 9	65 11		33 3	54 11	
" 8 ...	51 2	78 0		52 8	67 7		32 7	55 0	
" 15 ...	48 10	78 2		50 9	75 6		32 1	55 1	
" 22 ...	47 6	78 1		49 10	75 0		31 3	55 2	
" 29 ...	46 3	78 3		49 1	73 11		30 10	55 1	
July 6 ...	46 3	78 1		45 6	69 5		30 8	55 2	
" 13 ...	48 11	78 2		47 5	70 10		31 6	55 1	
" 20 ...	51 6	78 3		48 8	72 1		32 3	55 2	
" 27 ...	53 5	78 3		47 2	65 7		32 5	55 2	
Aug. 3 ...	55 1	78 2		46 1	73 6		32 9	55 0	
" 10 ...	56 7	78 4		46 11	76 1		31 2	55 0	
" 17 ...	58 1	78 7		48 0	68 11		30 8	55 6	
" 24 ...	59 0	76 7		47 1	70 7		31 6	54 7	
" 31 ...	59 4	72 1		48 5	60 4		30 5	49 0	
Sept. 7 ...	59 3	71 6		51 7	59 3		31 1	46 7	
" 14 ...	59 11	70 7		52 6	57 2		30 9	45 0	
" 21 ...	59 4	70 8		53 3	56 10		30 9	45 8	
" 28 ...	58 10	70 6		54 1	58 5		31 1	44 7	
Oct. 5 ...	59 2	70 8		54 5	57 9		30 9	44 9	
" 12 ...	59 7	71 0		53 10	58 5		31 6	44 5	
" 19 ...	60 9	70 8		53 8	59 3		31 11	44 1	
" 26 ...	62 10	70 10		54 6	60 1		32 10	43 0	
Nov. 2 ...	66 7	70 4		56 2	59 11		34 0	42 4	
" 9 ...	69 8	70 3		58 0	60 2		35 8	42 11	
" 16 ...	70 9	70 3		59 8	60 2		37 8	43 0	
" 23 ...	70 8	70 2		61 8	59 9		39 7	43 1	
" 30 ...	71 3	70 2		63 1	59 3		41 4	44 6	
Dec. 7 ...	72 1	70 7		65 6	58 7		44 1	43 5	
" 14 ...	73 2	71 2		66 5	58 0		45 10	43 6	
" 21 ...	74 8	71 1		67 3	57 7		46 5	44 2	
" 28 ...	75 10	71 1		67 5	57 7		47 4	44 10	

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

Average Prices of Live Stock in England and Wales in March and February, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	March. First Grade.	March. Second Grade.	February. First Grade.	February. Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight
Fat Stock:—				
Cattle:—	s. d.	s. d.	s. d.	s. d.
Polled Scots	75 5	70 1	75 4	70 0
Herefords	75 3	70 0	75 1	70 1
Shorthorns	75 2	70 0	75 0	70 0
Devons	75 0	70 1	75 0	70 0
Welsh Runts	75 0	69 6	75 0	70 0
Fat Cows	70 0	62 0	70 0	62 0
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d
Veal Calves	18	16½	17¼	15¾
Sheep:—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight
Pigs:—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	18 9	18 3	18 0	18 0
Porkers	19 0	18 3	18 0	18 0
Lean Stock:—	per head.	per head.	per head.	per head.
Milking Cows:—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	52 10	40 17	54 14	42 19
,, —Calvers ...	47 10	37 7	49 12	39 7
Other Breeds—In Milk ...	48 15	34 17	50 16	39 7
,, —Calvers ...	33 0	27 15	—	—
Calves for Rearing	4 3	3 4	4 5	3 6
Store Cattle:—				
Shorthorns—Yearlings ...	17 13	14 15	17 12	14 19
,, —Two-year-olds...	27 8	22 19	27 4	23 5
,, —Three-year-olds	36 10	31 16	34 5	30 15
Herefords —Two-year-olds...	29 14	26 0	28 16	25 1
Devons— ,,	28 16	24 1	28 10	25 8
Welsh Runts— ,,	27 7	23 3	27 15	24 15
Store Sheep:—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	79 10	67 8	77 6	66 2
Store Pigs:—				
8 to 12 weeks old	47 4	35 9	36 8	31 0
12 to 16 ,, ,, ...	77 5	59 4	58 6	45 7

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during March made prices equivalent to an additional 1½d. per lb. of the carcass weight for Downs, Cheviots, Blackfaced and Cross-breds and 1¼d. for Longwools and Welsh, and during February 2d. per lb. for Downs, Cheviots and Cross-breds, 2¼d. for Longwools, and 1¼d. for Black faced and Welsh.

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in March, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER:—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE:—						
British—						
Cheddar	152 0	—	—	—	152 0	—
			120 lb.	—	120 lb.	—
Cheshire	—	—	160 0	—	162 6	—
			per cwt.	—	per cwt.	—
Canadian	130 6	—	130 6	—	130 6	—
BACON:—						
Irish (Green)	182 0	—	181 0	—	182 0	—
Canadian (Green sides)	—	—	177 0	—	178 0	177 0
HAMS:—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS:—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	37 11	35 10
Irish	35 1	34 3	34 10	33 7	35 0	34 0
Egyptian	23 4	—	22 9	21 9	—	—
POTATOES:—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	150 0	140 0	125 0	117 6	140 0	130 0
Edward VII.	163 6	142 6	135 0	130 0	143 6	133 6
Up-to-Date	157 6	147 6	125 0	117 6	—	—
HAY:—						
Clover	—	—	—	—	151 0	143 6
Meadow	—	—	—	—	151 0	143 6

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in March, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	114 6	114 6	—	114 6	115 0
	2nd	114 6	114 6	—	114 6	115 0
Cow and Bull	1st	114 6	114 6	115 0	114 6	115 0
	2nd	114 6	113 0	107 6	110 0	115 0
Irish: Port Killed	1st	—	—	115 0	114 6	115 0
	2nd	—	—	109 6	114 6	115 0
Argentine Frozen—						
Hind Quarters	1st	123 6	124 0	123 0	124 6	127 0
Fore "	1st	100 0	98 6	95 6	100 0	99 6
Argentine Chilled—						
Hind Quarters	1st	111 0	—	107 6	124 6	—
Fore "	1st	97 0	—	88 6	100 0	—
Canadian Frozen—						
Hind Quarters	1st	—	—	—	129 6	—
Fore "	1st	—	—	—	99 0	—
VEAL:—						
British	1st	114 0	—	113 6	114 6	114 6
	2nd	114 0	112 0	93 6	110 0	106 0
Foreign...	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	122 0	122 6	125 0	122 0	123 0
	2nd	122 0	122 6	123 0	122 0	123 0
English...	1st	122 0	122 6	—	122 0	123 0
	2nd	122 0	122 6	—	122 0	123 0
Irish: Port Killed	1st	—	—	125 0	122 0	123 0
	2nd	—	—	123 0	122 0	123 0
Argentine Frozen	1st	119 6	119 0	114 6	119 6	118 0
New Zealand "	1st	—	—	—	—	—
Australian "	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	—	—	—	—
Australian	1st	—	—	—	—	—
Argentine	1st	119 6	119 0	107 6	119 6	121 6
PORK:—						
British	1st	133 0	133 0	—	133 0	—
	2nd	133 0	133 0	—	133 0	—
Frozen	1st	129 6	123 6	—	—	—

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	32	63	86	180
Animals attacked	38	80	100	211
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks...	7	3	10	8
Animals attacked	26	4	30	13
Parasitic Mange:—				
Outbreaks	613	341	1,866	1,021
Animals attacked	1,215	714	3,618	2,159
Sheep-Scab:—				
Outbreaks	40	70	201	322
Swine Fever:—				
Outbreaks	82	243	195	552
Swine slaughtered as diseased or exposed to infection	41	93	76	196

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	MARCH.		THREE MONTHS ENDED MARCH.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	1	—	1	2
Animals attacked	1	—	1	2
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange:—				
Outbreaks	11	8	46	15
Sheep-Scab:—				
Outbreaks	39	42	135	166
Swine Fever:—				
Outbreaks	4	27	6	58
Swine slaughtered as diseased or exposed to infection	12	168	26	367

The Weather in England during March.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F. †	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 2nd Mar.:								
England, N.E. ...	40·8	+1·8	0·32	8	— 4	4	4·2	+1·3
England, E.	40·4	+1·0	0·31	8	— 2	3	4·8	+1·9
Midland Counties ...	40·2	+0·9	0·25	6	— 6	4	4·0	+1·4
England, S.E. ...	40·6	+0.1	0·37	9	— 4	4	4·2	+1·1
England, N.W. ...	40·6	+0·7	0·34	9	— 7	4	3·5	+0·7
England, S.W. ...	41·1	—0·1	0·54	14	— 6	4	3·8	+0·8
English Channel ...	43·1	—0·9	0·72	18	+ 2	5	3·6	—0·2
Week ending 9th Mar.:								
England, N.E. ...	37·5	—2·1	0·21	5	— 7	4	1·5	—1·8
England, E.	38·3	—1·8	0·19	5	— 6	4	3·3	0·0
Midland Counties ...	37·4	—2·5	0·09	2	—10	2	1·7	—1·3
England, S.E. ...	39·5	—1·6	0·12	3	—11	2	3·3	—0·1
England, N.W. ...	38·4	—1·8	0·07	2	—15	2	2·5	—0·4
England, S.W. ...	39·3	—2·1	0·16	4	—17	1	3·5	+0·1
English Channel ...	42·2	—1·9	0·43	11	— 8	4	4·2	+0·3
Week ending 16th Mar.:								
England, N.E. ...	42·2	+1·4	0·06	1	— 8	2	2·6	—1·4
England, E.	42·2	+1·0	0·03	1	— 7	1	3·9	0·0
Midland Counties ...	43·1	+1·8	0·09	2	— 7	2	2·2	—1·3
England, S.E. ...	43·5	+1·2	0·03	1	— 9	1	5·9	+2·1
England, N.W. ...	42·4	+0·9	0·11	3	—10	2	2·4	—1·0
England, S.W. ...	44·0	+1·4	0·20	5	— 9	2	2·5	—1·3
English Channel ...	46·9	+1·6	0·05	1	—10	1	4·2	—0·7
Week ending 23rd Mar.:								
England, N.E. ...	47·6	+6·4	0·08	2	— 8	1	5·9	+1·5
England, E.	46·7	+5·2	0·05	1	—11	1	6·8	+2·5
Midland Counties ...	46·5	+5·2	0·14	4	— 7	2	5·8	+2·0
England, S.E. ...	46·2	+3·7	0·11	3	— 9	1	5·5	+1·1
England, N.W. ...	46·2	+4·5	0·20	5	— 8	2	5·4	+1·4
England, S.W. ...	46·0	+3·2	0·22	6	—11	2	5·1	+0·6
English Channel ...	47·4	+1·9	0·30	8	— 7	4	5·8	+0·9
Week ending 30th Mar.:								
England, N.E. ..	42·8	+0·7	0·41	11	+ 1	4	2·6	—1·8
England, E.	42·9	0·0	0·47	12	+ 4	4	3·2	—1·5
Midland Counties ...	43·8	+1·0	0·68	17	+ 7	3	3·5	—0·7
England, S.E.... ...	44·2	+0·1	0·68	17	+ 8	3	4·3	—0·6
England, N.W. ...	43·3	+0·7	0·57	14	— 1	4	4·7	+0·3
England, S.W. ...	45·5	+1·4	0·95	24	+ 9	4	6·4	+1·6
English Channel ...	47·6	+0·7	0·72	18	+ 6	3	6·5	+0·7

* 1 inch = 2.54 centimetres.

† In this column for last month the temperatures were inadvertently given in absolute instead of Fahrenheit degrees.

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SOILING CROPS FOR DAIRY COWS.

Owing to the reduction in the area of grass land and the short supplies of concentrated foods, it will be necessary for dairy farmers to grow green crops for summer feeding if supplies of milk are to be fully maintained. The choice of these crops will be determined by local conditions, and it is obviously impossible to give advice which can be applied exactly to all parts of the country. The accompanying tables have, however, been drawn up as a rough guide, the dates given being applicable to average conditions in the Midlands of England. In the North of England the times of cutting, etc., will in most cases be about a fortnight later; in the South, a week or two earlier.

From the list of crops given a succession of green food, from kale and rye in April to cabbages in November, can be provided. For the winter period the various root crops would be available; their cultivation is so general that it has not been thought necessary to give details.

In some cases the same ground will carry two crops in the course of a year. For instance, land carrying autumn-sown kale and cleared by the end of April may be sown with spring oats and vetches (mixed). Rye may be followed by cabbages or maize; oats and vetches by cabbages, rape, or white turnips; late-sown oats and vetches by thousand-headed kale or rye. In most cases these crops will only be regarded as supplementary to pasture, but to indicate the possibility of dairying even when very little grass is available a column has been included showing the number of days for which a herd of 10 cows could be maintained on the forage crop alone. The figures are based on the assumption that a cow receiving no grass would require 80 lb. of green food per day.

At the Harper Adams Agricultural College in 1917, 6·3 acres of soiling crops and 1·5 acres of seeds hay produced green keep for 10 cows from 25th May to 30th November, with the exception of 7 days in August when the cows were fed on

clover aftermath. The manured plots averaged in yield from 8 to 9 tons per acre; the unmanured plots 6·2 tons. The yield of milk per acre was 499 gal., and the field, in addition, produced 372 lb. per acre of live-weight increase in the sheep folded on the three kale plots which were taken after the fodder crops; also in April the field produced keep for 87 ewes and 102 lambs for 10 days.

TABLE I.—*Green Food, supplementary to Grass, required for the Maintenance of* 100 *Cows.*

—	—	Green Food per Cow per Day.	Total Quantity Green Food for 100 Cows for Period.	Approximate Acreage of Crop Required.
Mid May to end of June.	100 acres of grass.	Mixed winter oats and vetches if droughty June.	—	3 acres.
1st to 15th July.	,,	Mixed winter oats and vetches, 40 lb.	27 tons	3 ,,
15th July to 31st August.	,,	Mixed spring oats and vetches or peas, 40 lb.	81 ,,	8 ,,
September and October.	,,	Maize, cabbages, rape, 80 lb.	215 ,,	8 acres maize or cabbages (in addition to rape or white turnips, which would follow oats and vetches as above).
November	—	Cabbages and rape, 80 lb.	108 ,,	4 acres cabbage (in addition to rape or white turnips as above).
December to March (inclusive).	—	Mangolds, 80 lb.	430 ,,	17 acres.
April ..	—	Mangolds, 40 lb. thousand-headed kale, 40 lb.	54 ,, 54 ,,	5 acres mangolds. 5 acres kale taken on land previously cropped with oats and vetches.
1st to 15th May.	100 acres of grass.	Rye, 40 lb. ..	27 ,,	5 acres rye taken on land previously cropped with oats and vetches.

So far as grass, green food and roots are concerned, the herd of 100 cows could thus be maintained on—

Pasture		100 acres grass.
Mangolds	22 acres.	
Cabbages and maize	12 ,,	
Winter oats and vetches .. (followed by rape and kale.)	6 ,,	
Spring oats and vetches .. (followed by kale and rye.)	8 ,,	50 acres arable (approx.).

TABLE II.

Suggested Cropping during Year.

Crop.	Time of Sowing.	Amount of Seed per Acre.	When Ready for Use.	Period in which Available.	Weight of Green Food per Acre under Good Average Conditions.	Number of Days for which 1 Acre might Keep 10 Cows (without Grazing).
Giant rye ..	August and September	150 to 180 lb. ..	End of April	May	6 or 7 tons	17 to 20 days.
Mixed winter oats and vetches.	September and October	120 lb. oats, 60 lb. vetches.	Beginning of June.	June and early July	9 or 10 tons*	25 to 28 days.*
Mixed spring oats and vetches or peas.	March and April ..	120 lb. oats, 60 lb. vetches, or 100 lb. field peas.	End of June	July and August ..	10 or 12 tons*	28 to 33 days.*
Cabbages (early)	Autumn, transplanted early in spring.	1 lb. seed 12,000 plants.	Beginning of August.	August and September.	20 tons ..	56 to 60 days.
Cabbages (Late Drumhead).	Autumn, transplanted in early summer.	1 lb. seed 10,000 plants.	End of Sept.	October, November and December.	25 to 30 tons	70 to 84 days.
Cabbages (early)	April and May ..	2 lb. seed ..	October ..	October and November.	20 to 25 tons	56 to 60 days.
Maize	End of May and beginning of June.	100 to 112 lb. ..	Beginning of September.	September and October.	20 tons ..	56 to 60 days.
Kale (marrowstem)	April and May ..	3-4 lb. in rows, or 5-6 lb. broadcast.	End of September.	" " ..	15 tons ..	40 to 45 days.
White turnips ..	July	2-3 lb. in rows ..	November ..	November and December.	10 to 15 tons	28 to 40 days.
Rape	July and early August	5-6 lb. broadcast	End of October	November ..	7 to 12 tons	20 to 30 days.
Kale (thousand-headed).	" "	" "	March ..	March and April ..	10 to 15 tons	28 to 40 days.

* Any surplus not required for soiling should be made into hay or silage.

The cows were turned out daily into a small paddock for exercise, but the amount of grass they could obtain in this way was negligible. In addition to the green food, which averaged 80 lb. a day, they received 4 lb. of cake per head daily.

On most farms the grass on the farm would be almost adequate to maintain the maximum flow of milk from the middle of May to the end of June. During July and August half-rations of supplementary green forage would be required, and only from September onwards would the green crops have to provide the greater part of the raw material for milk production.

The scheme of cropping and management (Table II.) may be taken as an illustration of the possibilities of this system. It is assumed that the land is of good average quality, that 100 cows have to be provided for, and that the total area of grazing is 100 acres, no aftermath being available. In a good grass year the amount of supplementary green food required would be much less than that allowed, but in order to safeguard against drought it would be advisable to produce the quantities stated. Any surplus could be stored or made into hay or silage, or utilised for other stock, as the case may be.

This article is also being issued as Food Production Leaflet No. 37. Copies free on application.

THE STOCK-CARRYING CAPACITY OF GRASS AND TILLAGE LAND.

IN Food Production Leaflet No. 7, *Maintenance of Supplies of Hay and other Fodder Crops*,* an example was given to show that in the case of a dairy farm the area of arable land could be greatly increased and grain grown for sale without diminishing the stock-carrying capacity of the farm. In the following illustration it is shown how on a stock-rearing farm, the area under tillage may be trebled in three years without causing any decrease in the output of stock.

The case is assumed of a west-country stock-rearing farm of 300 acres, of which 50 acres are under the plough and worked on a four-course shift; 50 acres are good feeding land, and the remaining 200 acres are grass of moderate quality, much of which is on a well-drained free-working loam and has been laid down within the last 20 or 30 years. The present system of working would generally be somewhat as follows:—

A herd of about 20 cows would be kept; all the home-bred calves would be reared and, in addition, an equal number of calves

* Printed in this *Journal*, September, 1917, p. 649.

would be bought. A few of the best heifers would be retained to take the place of draft cows sold either as fat or calving cows; the remainder of the calves would be reared and finally fattened in summer on the best pastures at about 2½ years. With the area of fattening pastures mentioned it would usually be the custom to buy in ten or twelve additional stores in spring, and on most farms of the class under consideration, a "flying flock" of ewes would be kept for fat lamb production, both ewes and lambs being sold off in summer and early autumn. It is probable that some 50 acres of grass would be reserved for hay every year and the whole of the 12½ acres of clover would also be mown.

The average number of animals kept on the farm during summer would be :—

20 Cows, including 5 or 6 to be drafted at end of summer;
5 or 6 In-calf heifers;
40 Calves;
38 Yearlings;
32 Home-bred two-year-old cattle } Fattened on best grass;
10 Purchased cattle }
150 Ewes and their lambs;
5 Horses.

Without going into details it may be stated that the home-grown hay, straw, roots and corn, with the addition of a little purchased cake for the cows, would maintain the winter stock, but it is certain that on an average there would be no surplus for sale and that no winter fattening could be practised without incurring an excessive expenditure on concentrated feeding stuffs.

In these circumstances the total production of the farm per annum would be approximately as follows :—

32 Fat home-reared bullocks and heifers, say 11 cwt. each	352 cwt.
10 Purchased bullocks fattened on grass—net increase, say 2½ cwt. each	25 ,,
6 Draft cows, say 11 cwt. each	66 ,,
190 Lambs, about 100 lb. each	170 ,,
8 Fat pigs, say 2 cwt. each	16 ,,
Total live weight	629 ,,
Wool, say	750 lb.
Butter, say	2,200 ,,

(N.B.—*The increase in weight of ewes would probably be about balanced by losses during winter and in lambing.*)

Assume now that, as a result of the grave national need, 100 acres of the moderate quality grass land are put under the plough, to be worked ultimately along with the existing arable land on a four-course rotation, and that 10 acres of the lightest fattening pastures are also ploughed. This rich land would not be likely to grow corn satisfactorily when newly broken, and should be cropped mainly with potatoes for the first year or two.

If 10 acres of the fattening pastures have been ploughed the number of stock fattened in summer would be reduced and no store bullocks would be purchased in spring. With this exception, it would be desirable to maintain the usual head of cattle so as to provide for the consumption of straw and the making of dung in the winter. The ewe flock would have to be reduced considerably, say to 50, and the number of horses increased to say 9, to provide for the extra cultivation.

The grazing available would be ample for the reduced number of stock, provided that none of the permanent grass were reserved for hay, that about 20 acres of the clover were grazed, and that about 5 acres of the root break were devoted to the growth of green crops, such as maize, vetches, cabbage, kale, rape, etc., for providing supplementary food in early autumn.

The following summary shows the grazing area under the two conditions. The last column shows the area after the new system has come into full working order. The transition period will be considered later.

Summer Grazing.	*Before the Change: 50 Acres Arable.*	*After the Change: 160 Acres Arable.*
Fattening pasture	50	40
Moderate pasture	150	100
Clover	—	20
Permanent meadow aftermath	50	—
Clover aftermath	12½	20
Young seeds in autumn	12½	40
Stubbles for ewes	12½	40
Vetches, cabbage, kale, rape, maize, etc.	—	5

The winter feeding would obviously be considerably modified, and the supplies of food under the two sets of conditions must first be summarised:—

	Before the Change: 50 Acres Arable.		*After the Change: 160 Acres Arable.*	
Meadow hay	50 acres	75 tons.	—	—
Clover hay	12½ ,,	25 ,,	20 acres	40 tons.
Straw	25 ,,	32 ,,	80 ,,	110 ,,
Total long fodder		132 ,,	—	150 ,,
Less straw for bedding, thatching, etc.		15 ,,	—	25 ,,
Long fodder for feeding		117 ,,	—	125 ,,
Oats	25 acres	150 qr.	40 ,,	240 qr.
			Less grain sold	60 ,,
				180 ,,
Tail wheat and barley			40 acres	40 ,,
Roots	12½ acres	250 tons.	25 ,,	500 tons.
Small and diseased potatoes			10 ,,	15 ,,

The hay formerly fed to the cattle would largely be replaced by straw and an increased allowance of roots. In all probability some cattle would be fattened during the winter, but for the sake of clearness it may be assumed that the management in this respect is unchanged. The surplus roots would be eaten on the land by store sheep purchased in autumn, and about 200 would on an average be required. The purchase of cake would have to be increased to finish these unless peas or dredge corn were grown for the purpose, but in any case the expenditure on this item would be comparatively small.

The total saleable production per annum of the farm managed on this system would be about as follows :—

32 Fat home-reared bullocks and heifers, say 11 cwt. each	352 cwt.
6 Draft cows, say 11 cwt. each	66 ,,
63 Lambs, about 100 lb. each	56 ,,
200 Purchased lambs fattened on roots, net increase, say 40 lb. each	71 ,,
40 Fat pigs, say 2 cwt. each	80 ,,
Total live weight	625 ,,
Wool (from ewes), say	250 lb.
Butter	2,200 ,,
Wheat and barley, at 4 qr. per acre (marketable) ..	160 qr.
Oats (part of crop)	60 ,,
Potatoes, at 6 tons per acre net (marketable)	60 tons.

Comparing these figures with the corresponding ones set out on p. 145 it is clear that not only would the farm under the new conditions be of greater value to the nation, but the price realised for the increased produce sold would be ample to cover a considerably increased expenditure on labour. The chief additional expenditure in other directions would be :—

Cake for fattening sheep, say average of ½ lb. a day each for 16 weeks = 5 tons.

Artificial manure for additional roots, 28 acres at average of 30s. an acre = £42.

Seed for 55 acres corn crop, 28 acres clover, and 28 acres roots.

The main difficulty would arise in the first three years, and a considerable modification of the working of the farm would be necessitated if the whole of the additional 110 acres had been ploughed up for 1918. It is, however, unlikely that it would be possible to treble the arable area at once. In many cases an increase of some 40 or 50 acres, including 10 acres for potatoes, would be as much as could be secured in the first year. The accompanying table shows the cropping whereby the new system would be in full working order by 1920. Excluding for the first two years the good land devoted to potatoes, the newly-broken land is each year cropped one-half with corn

1917. 50 Acres Arable.	1918. 96 Acres Arable.	1919. 132 Acres Arable.	1920. 160 Acres Arable.	1921. —
Old Arable—12½ acres roots	12½ acres corn ..	12½ acres clover ..	12½ acres corn.	
12½ ,, corn	12½ ,, clover ..	12½ ,, corn ..	12½ ,, roots.	
12½ ,, clover	12½ ,, corn ..	12½ ,, roots ..	12½ ,, corn.	
12½ ,, corn	12½ ,, roots ..	12½ ,, corn ..	12½ ,, clover.	
10 acres fattening pasture, broken up.	10 ,, potatoes ..	10 ,, potatoes ..	10 ,, corn ..	Vetch mixture.
	9 ,, roots and green crop.	18 ,, corn ..	18 ,, clover ..	Corn.
36 acres meadow, broken up	9 ,, oat, pea and vetch mixture	9 ,, roots and green crop. 9 ,, vetch mixture	18 ,, corn ..	Clover.
	18 ,, corn ..			
	36 ,, grass broken up.	9 ,, roots and green crop. 9 ,, vetch mixture	18 ,, corn ..	Roots, potatoes and green crop.
		18 ,, corn ..	9 ,, roots, potatoes and green crop. 9 ,, vetch mixture	Corn.
			9 ,, corn ..	Roots.
		29 ,, grass, broken up.	9 ,, roots, potatoes and green crop. 10 ,, vetch mixture	Corn.

and one-quarter each with roots and vetch mixture respectively. The vetch mixture is intended for mowing as a hay crop, or, if required, for silage or soiling purposes. After it has been cleared the land should be either half fallowed as a preparation for wheat, or sown with rape or white turnips to be folded on the land as a preparation for spring corn. In either case the corn crop would be seeded with rye-grass and clover.

In the third year the potato land takes its place as part of the ordinary arable land.

If it had been possible to break up for 1918 more than the 36 acres of the moderate grass-land, plus 10 acres of the fattening pasture, such excess could be cropped with corn again in 1919, and then be treated as part of the newly-broken land.

It would be easy to improve on the system suggested and to increase the production to a much greater extent, but the simplest possible case has been taken for the sake of clearness.

This article is also issued as Food Production Leaflet No. 40, copies of which can be obtained on application.

SUPPLY OF SILOS BY THE FOOD PRODUCTION DEPARTMENT.

IN view of the shortage of the usual feeding stuffs for cattle, the Food Production Department is satisfied that it is both commercially to the interest of farmers and nationally important that the use of silage, on up-to-date lines, should be greatly extended. The Department is, therefore, prepared to help agriculturists, who wish to build silos on their farms, in the following ways :—

(*a*) By giving expert advice in all cases where the construction of a silo is contemplated.

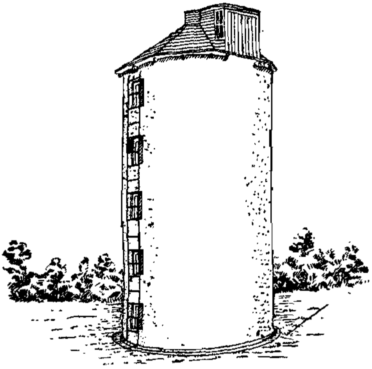
(*b*) By supplying free of charge full working drawings, specifications and bills of quantities for two sizes of silos constructed in either reinforced concrete or reinforced brick work, in cases where the landowner or farmer wishes to make his own arrangements for building the silo. (The drawings, etc., can be seen at the office of the County Agricultural Executive Committee, and obtained from the Food Production Department).

(*c*) By lending at a moderate charge all forms and centering (moulds) needed for the construction of one of the above standard silos, and facilitating the issue of permits for materials.

(*d*) By contracting with the landowner or farmer for the complete construction of silos at a fixed price, which will be quoted after investigation of local conditions.

(*e*) By assisting anyone who wishes to construct a concrete or brick silo of some approved type, but of a size or design other than one of the standard types mentioned above, to obtain Priority Certificates for the materials needed. (Special designs cannot be provided by the Department in such cases).

It is to be clearly understood that while the Department is prepared to do all that it can to help farmers in this matter, nothing stated herein or upon the drawings or other particulars supplied by the Department shall be construed to imply a guarantee of any of the matters or things referred to.



Silo of 100 C Type.

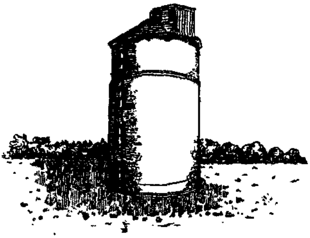
The Silo.—Two sizes of silo have been provided for :—

Size 100	15 ft. diameter by 30 ft. high. Capacity 5,300 cubic ft. or nearly 200 cubic yards. Holding, say about 100 tons of silage. Suitable for a herd of about 25 cows.
Size 50	12 ft. diameter by 24 ft. high. Capacity 2,710 cubic ft. or about 100 cubic yards. Holding say about 50 tons of silage. Suitable for a herd of about 12 cows.

Each size can be constructed either in reinforced brickwork, style "B," or in reinforced concrete, style "C." Thus for reference purposes a silo built in brick 15 ft. diameter by 30 ft. high would be described as a "100 B" silo, and one of 12 ft. diameter by 24 ft. high made of concrete would be styled a "50 C" silo.

Each silo takes the form of a hollow, round tower covered with a wooden roof in which ventilation is provided. It is

fitted with a large door at the top through which it is filled. There are also a number of smaller doors, arranged one above the other up the side of the silo, which are used in succession as the level of the contained silage sinks, for its delivery when required for feeding. Provision is made for suitable drainage and for steps by which the doors can be reached from the ground. These silos are intended to be filled with un-chaffed crops by means of the ordinary elevator with horse gear such as is to be found on many farms. There is nothing, however, in their construction to prevent farmers from adopting the American system of chaffing the crop and blowing it into the silo if they prefer this method of filling, and have, or can obtain, the necessary plant consisting of engine, chaff-cutter and blower. The Department cannot, however, undertake to obtain the necessary permits for either the manufacture in this country, or shipment from abroad, of chaff-cutters and blowers for this purpose.


Silo of 50 B Type.

Cost of the Silo.—In order to obtain an approximate idea of the cost of a particular silo, it may be assumed that in situations where there are no special local difficulties and where good, clean sand and ballast are readily obtainable, a concrete silo of size 100 C will cost at the present time roughly £310, and one of size 50 C roughly £210.

Where bricks are more easily obtained than ballast, "B Type" silos will probably be preferred, costing roughly £340 for size 100 B, and £235 for size 50 B. In each case it is assumed that the purchaser will himself cart the materials to the site. The estimated weights for each type are as follows:—

100 B	100 C	50 B	50 C
140 tons.	102 tons.	95 tons.	70 tons.

Site for the Silo.—To save labour the silos should be built close to the cattle-shed, and, if possible, should deliver straight into them. It is very necessary that there should be a good road and ample space around the base of the silo on the side from which filling operations are to take place.

Crops for the Silo.—The Technical Division of the Department is prepared to give information as to the choice of suitable

silage crops and as to the process generally. The following is a list of crops which could be well and efficiently preserved for cattle-fodder if a silo were erected in time for their reception this year. or may be grown for silage in 1919.

Approximate Acreage required to fill Standard Silos.

Crops for Silage.	*Silo "size 100." Acres.*	*Silo "size 50." Acres.*
Maize	6	3
Oats and vetches	$9\frac{1}{2}$	$4\frac{3}{4}$
Lucerne (2 cuts)	$9\frac{1}{2}$	$4\frac{3}{4}$
Red clover and rye-grass	13	$6\frac{1}{2}$
Red clover	15	$7\frac{1}{2}$
Meadow grass	17	$8\frac{1}{2}$
Sainfoin	12	6

Advantages of Silage.—1. It is a means of preserving green fodder in a succulent state for winter feeding.

2. It is independent of weather, and is, therefore, safer than hay-making in wet seasons.

3. On heavy clay lands or on light soils in dry districts, where roots are precarious, there is almost a certainty of obtaining a silage crop.

4. It is cheaper than root-growing under unfavourable conditions.

5. If the silaged crop is sown in early spring, or, preferably in autumn, it can be got off in time for turnips or rape to be taken, or a bastard fallow made.

6. The usual silage mixture of oats and vetches is a useful cleaning crop. Stubble land, therefore, which in the ordinary course would be bare-fallowed, may safely be sown with oats and vetches and cleaning completed in time for autumn corn by means of a bastard fallow.

7. Stock fed on silage made from leguminous crops, *i.e.*, clover, lucerne, sainfoin and vetches, will require less oil cake than stock fed on roots; moreover, such crops tend to increase the fertility of the land.

8. It will enable poor heavy land now in grass to be brought under tillage, cleaned and improved.

9. The labour involved in feeding silage is very much less than that of feeding roots.

10. It will be seen by a reference to Leaflet No. 9 (to be obtained from the Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1), which deals with *Ensilage*, that in cases where a farmer finds himself short of the usual silage crops the silo may be filled up with coarse grass, hop-bines (directly the hops are picked), and even nettles and weeds. Materials which otherwise stock would reject, may be made into edible silage.

FARM COSTING.

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General.—Systems for ascertaining the cost of production in manufacturing concerns are quite common in Great Britain. They aim at ascertaining costs for one or more of the following reasons :—

For fixing the selling prices of the articles produced.
For supplying figures for future use.
For submitting tenders in competitive trade.
For checking and regulating the various items of cost.
For comparing one year's working with another, and the manufacture of similar articles under the same, or varying or different conditions.

Cost accounts may be grouped as follows :—

Departmental Costs.—These are used for finding the cost of working each department or section of a business.

Multiple Costs.—These are applicable to an undertaking where a variety of products is manufactured bearing little or no apparent relation to one another in cost or in selling price.

Terminal or Contract Costs.—These apply to an undertaking where definite contracts are entered into, in which the costing is definite or terminating.

Single or Output Costs.—These are applicable to undertakings producing the same article all the year round, in which case the unit of cost per quantity produced is the vital factor.

Farm costing has only been experimented with in Great Britain, and has not yet become a general practice. Indeed, it is still in its infancy (even in the case of large farms and country estates) and is likely to remain so until the farming classes become more acquainted with the keeping of financial accounts in the first instance and realise the importance of them and the possibilities of their relation to cost accounts.

Costing systems have become built up in commercial life subsequently to the application of efficient methods of book-keeping in connection with the financial books, and the need for such systems has arisen by reason of the highly industrialised efficiency now common, and the competitive methods as now practised. Until, therefore, the farming classes adopt a good system of financial accounts, and thoroughly understand the working and the importance of them (efficient book-keeping amongst farmers is still uncommon), the importance of cost accounts in farming remains to be realised.

No two businesses which manufacture or produce different articles can adopt the same method of keeping cost accounts ;

for a costing method must be brought down to fit in with the exact requirements of the undertaking. A business cannot be brought into the four corners of a particular costing method for the reason that every business possesses peculiarities of its own which require special consideration in devising a method of costing which will prove efficient. Furthermore, it is correct to state that no two farms can adopt the same method of costing in detail, but the principles of costing will, of course, be the same in every case. The system, so far as costing principles are concerned, always remains the same, but the method by which the principles are carried into effect is exceedingly variable. The method of costing for every farmer desirous of adopting a costing system must be specially prescribed, and every farm must be considered separately, for considerations apply to one which may be entirely absent in another, and may require the costing system to be devised upon certain well-defined lines. General published costing systems, therefore, will require to be modified or varied to suit the particular case which may be under notice. Every individual farm, therefore, should be specially considered in devising a method of farm costing. If developments take place on a farm, the costing system may require to be expanded to suit the new conditions, and the method may require to be altered to some extent. If a market garden were to be cultivated as an adjunct to a farm, it is evident that a separate section of the costing system would be necessary for the garden. It should be stated here that any costing system should be carried out quite apart from the financial system of accounts. Considerations of principle which it is necessary to keep in mind in the financial system may be modified or even disregarded in the costing system, for the two systems are designed to serve widely different purposes. In the financial system, statements of the gross and the net profit over a certain period are aimed at, with the collection of information showing the sources of the profit, together with a statement of the assets and the liabilities as existing on a certain date. In the costing system the aim is to show the profit or loss on each section of the undertaking, after taking into consideration the use of the assets employed therein. As the selling price of farm produce is fairly well fixed, either in the local or in the central market, normally depending upon supply and demand, competitive selling of stock and produce is almost absent. In such cases the costing system should aim at effecting economy in expenditure so as to reduce the cost of production.

The following system, which it is suggested will be found to be comparatively simple in use, as costing systems go, will provide all the information required for the purpose of regulating and organising the working of farms. It can be applied either to large or to small farms, and also either to farms individually or collectively.

Only the most important items of expense are here dealt with, but it is suggested that it includes the nucleus of an efficient costing system, and items and accounts which may be found to require the most attention, and which are no doubt the most important, are briefly explained.

SCHEME FOR THE INSTITUTION OF A COSTING SYSTEM FOR FARMS.

The cost of production and the profit or loss on each section of the farm are what is required. Separate cost sheets, cost cards, or a page of a cost ledger should be provided for each section for which it is desired to ascertain costs. A specimen ruling for such a cost sheet is shown in Appendix I. (p. 163).

A cost sheet will be required for each field or patch of ground cultivated or grazed, also for the piggeries, poultry, vegetable garden, etc. It will be necessary either to name or number each individual field or patch for purposes of identification. As it will be necessary to charge to some of the cost accounts a proportion of the rent and rates of the farm, each patch or field thus described should have assigned to it a charge, consisting of a sum of money representing rent, rates, and taxes. The sum to be charged to the various fields will need to be calculated equitably in relation to the total of the expenses named. Where a separate rent is paid for a field, such rent would of course be the amount to take into the cost account, the general rent being apportioned over the other parts of the farm. Similarly, where rates or taxes are paid on individual fields, such sums should be taken direct to the cost accounts concerned. In the same way each building which may be in use for a definite purpose should likewise have assigned to it a rental value. Such buildings would include cow-houses, stables, and the farmhouse. A small building for the storage of loose general tools may be omitted from this category, but one used exclusively for the storage of tools of a particular section of the farm should be taken into consideration.

At the end of the year the rental value of the farmhouse would be distributed over the other cost accounts in accordance with the various activities which had been carried on during the year, and also in accordance with a scheme for fairly

distributing the amount. By reason of the fact of its being necessary to take such expenses into account, the cost accounts must be annual accounts, corresponding with the financial year of the farm, especially since the annual valuations will be brought into the costing system as well as into the financial accounts.

Books Necessary.—In all costing systems there are direct and indirect expenses. Direct expenses include all those expenses which can be immediately and wholly charged to the cost account concerned, *e.g.*, seeds for a particular crop. Indirect expenses include general administrative and supervision expenses. The books which it will be necessary to keep are the following :—

(*a*) *Goods, Stock, and Stores Received Book.*—In this book should be entered the cost price of all goods, live stock, and stores received on the farm, as and when received, irrespective of whether the transaction is a cash transaction or one on credit. If the book is ruled in columnar form it can be totalled periodically, say monthly, and the cost-sheets entered up therefrom in summary form, cross referencing being employed. The items should be debited to the various cost accounts affected, and a Purchase Adjustment Account credited, so as to effect the double entry. The credit entry should be made in total. (See Appendix II., p. 164.)

(*b*) *Sales, Stock, or Goods Outwards Book.*—In this book should be entered the selling prices of all stock or produce sold, as and when sold, and irrespective of whether the transaction is for cash or on credit. It should follow much the same method of working as the Goods Received Book, but as it will work conversely to that book the entries made therein should be debited in total to a Sales Adjustment Account and credited in detail or in summary form to the various cost accounts affected. A ruling (with variations of heading) similar to the Goods Received Book (see Appendix II., p. 164) will serve for this book.

(*c*) *Transfer Book or Journal.*—This book should be used for recording transfers, apportionments, and adjustments between two or more accounts in the costing system, *e.g.*, the transfer of manure from the stables or the piggeries to the various fields. No transfer whatsoever should be made except through the medium of this book, as otherwise valuable and mutual dealings between two sections of the farm will be unrecorded in any book of original entry. Moreover, the omission to enter a transfer in the Transfer Journal may be the means of leaving a

transaction unrecorded in the Cost Ledger, and, as any costing system must provide for the taking into account of every detail, such an omission would weaken the system. There will no doubt be such items as rent, rates, taxes, insurance, and other periodical expenses to be met, which would not seem to come within the definition of the Goods Received Book. These may conveniently be passed through the Journal preparatory to their entry into the Cost Ledger. In such cases the entry would be as follows :—

	Dr.	*Cr.*
Rent	£100 0 0	
To General Adjustment A/c ..		£100 0 0

The ordinary ruling for a Journal will suffice for this book.

(*d*) *Wages Book*.—Time-sheets for each workman employed on the farm should be kept. These should be written up daily by the workmen or the foreman, and totalled and signed by the foreman at the end of each week. The time-sheets should then be summarised according to the particular work upon which a man has been employed, and entered into the Wages Book. This book should be totalled periodically and the amount thereof debited in summary form to the cost accounts concerned, the total being credited in one sum to a Wages Adjustment Account. The amount deducted for national insurance should be taken into the summary of wages, and the employer's contribution distributed over the sections on which the workman has been engaged, the whole being taken into the Wages Book. When the insurance cards are stamped no further attention need be given in the costing system to the cost of the insurance stamps, these having already been taken into account. The rent of a cottage in which a workman may reside free of rent should be allocated at the end of the year to the accounts of the various sections on which the workman has been employed. Perquisites of office should be dealt with similarly. Such items should be passed through the Journal, debited to the various cost accounts concerned, and credited to the Wages Adjustment Account. (See Appendices III. and IV., pp. 165 and 164 respectively.)

(*e*) *Cost Ledger*.—This should contain the various cost-sheets and could conveniently be a loose-leaf ledger. The cost-sheets could then be taken out and bound up separately year by year, one year's costing forming a separate volume. (See Appendix I., p. 163, for specimen cost-sheet.)

Special Considerations.—Some of the accounts will require very careful treatment if the result aimed at is to be portrayed

in a form which will leave little or nothing to be desired. It may, therefore, be advantageous to consider some of the most important accounts.

Sheep Account.—This account will contain the following items, amongst others :—

Dr. side.	*Cr. side.*
Initial cost or valuation.	Proceeds of Sales.
Cost of ram service.	Valuation at end of year.
,, special food.	
,, grazing (portion of rental of fields).	
Wages.	
Balance (profit) to Costing Profit and Loss Account.	

If other stock in addition to sheep have grazed from the same field, and at the same time, *e.g.*, horses, the rental value of the field should be equitably apportioned between the several classes of stock. If stock have been grazed for a portion only of the year on a particular field, the question of the relative value of the field at the different periods of the year should be taken into account in charging up the rental value. Also, in view of the fact that sheep, cattle, and horses may graze the same field, either together over a definite period, or in varying numbers over that period by reason of sales, purchases, rearing, etc., it is desirable that stock record cards should be kept, giving particulars as to the numbers of the various classes of animals grazed, and the periods of grazing. In addition, daily records of the work which has been done on the farm, especially with regard to the transfer of stock, implements, materials, produce, manure, food, etc., should be kept, preferably by the foreman. Much of the information contained in these records will need to be taken into consideration when writing up the Journal. No more than the actual rental value (rent, rates, and taxes) should be charged over the whole of the various accounts during the course of the year.

Crop Accounts.—These accounts will contain on the Dr. side the rental value of the field, the labour expended upon it, the cost of seeds, manure, and harvesting expenses ; and will be credited with the proceeds of the sale of the produce, together with the valuation at the end of the year. The profit or loss should be transferred to the Costing Profit and Loss Account. Where similar produce is grown on two separate fields, either one account may be opened for the whole crop or as many accounts may be opened as there are distinct fields or patches.

Pigs Account.—This account should be made up as follows :—

Dr. side.	*Cr. side.*
Initial cost or valuation.	Sales.
Cost of boar service.	Manure transferred to other parts of the farm.
,, special food purchased.	Valuation.
Rent of piggeries (rent of land, plus proportion of initial cost of erection of piggeries).	
Wages.	
Food transferred from other parts of the farm, and grown thereon.	
Profit to Costing Profit and Loss Account.	

It is suggested that the initial cost of the erection of the piggeries should be capitalised in the costing system and a portion written off each year to the Pigs Account until the capital account is entirely extinguished. The capital account should be written off in three or five years, after which period all repairs or additions (excepting substantial additions) should be charged to the Pigs Account as and when incurred. The valuation of the pigs as entered in the Pigs Account should include also the value of the piggeries after the Capital Account has been extinguished.

As regards the food grown on the farm and consumed by the pigs, it will be necessary to assign to this a certain price. It should be the current local market price, this price being that which would have been obtained had the produce been sold on the market, and also the price which would have been paid had it been purchased on the market. It will also be necessary to fix upon a fair and reasonable price for the manure credited to the pigs.

Milking Cows Account.—This account will be debited and credited as follows :—

Dr. side.	*Cr. side.*
Initial cost or valuation.	Sales of animals.
Rental value of cowhouses.	,, milk.
,, ,, grazing meadows.	,, butter.
Cost of purchased food.	,, cheese.
,, bull service.	Transfer of manure to land.
,, conveying milk to market or station.	,, calves to Grazing Cattle Account.
,, food grown on the farm and fed to the cows.	
Wages.	
Depreciation on milk churns and other loose plant.	
Profit to Costing Profit and Loss Account.	

If it is desired to keep a Dairy Account, some of the items included above would need to be taken into that account,

in which case it would be necessary to charge the milk up to the Dairy Account at a fixed price.

The same remarks apply in the case of milking cows as in the case of pigs in regard to the price of the food grown and consumed on the farm. A special account for the valuation or cost of milk cans and other loose plant connected with the cows should be opened, and an amount, representing depreciation, written off annually to the Milking Cows Account; but only so much of the capital account representing depreciation should be written off as is written off the general valuation of such articles by the valuer at the end of the year.

Where calves are reared apart from the cows, the value of the calves should not be transferred from the Cows Account till they are sold, or finally transferred as grazing cattle to the Grazing Cattle Account, or otherwise disposed of so far as the Cows Account is concerned. The milk which is thus fed to the calves and the labour connected therewith will not need to be otherwise specially accounted for, as the calves will remain for the time being part and parcel of the Cows Account.

Milk records are not dealt with here as they form no part of the cost accounting system; but they should of course be kept, when the average cost of milk per specified quantity can be obtained, as also can the selling price and other figures connected with the production of milk. Comparative figures year by year, or oftener, will prove most valuable.

Horses and Carts.—It will be a good plan to ascertain or estimate the cost per day of keeping a horse and cart in working order (Sundays excepted) including depreciation, but excluding wages. The average cost over the past year, if available, should be taken to commence with. It will be necessary to check the unit of cost annually or oftener. Sections of the farm which have benefited by horse and cart labour (daily records should be kept) can be charged at frequent intervals on the basis arrived at.

At the end of the year the total cost of keeping the horses and carts in working condition can be accurately obtained, when any balance appearing on the account can be distributed proportionately over the accounts affected. If too much has been charged under this head it will be necessary to credit the accounts concerned, so as to retain no balance on this account. In this case it will be necessary to open separate capital accounts for (i.) horses, and (ii.) carts, waggons, etc., and also a separate working account. The latter will appear as follows:—

Horses and Carts Account.

Dr. side.	*Cr. side.*
Horse keep.	Transfer to Wheat Crop.
Repairs to harness.	,, Turnip ,,
,, carts and waggons.	,, Hay ,,
Shoeing.	,, Beet ,,
Wages.	,, Rye ,,
Depreciation of horses, saddlery, carts, and waggons (not exceeding the amount written off in the annual valuation).	etc., etc.

If desirable, the cost of horses and implements (harrows, ploughs, etc.) can be treated in this account.

Machinery.—Bone-crushing, chaff-cutting, and other similar machinery may be included in this account, which should include the following :—

Dr. side.	*Cr. side.*
Initial cost or valuation.	Valuation.
Cost of petrol, or other power used.	Transfer of balance to accounts concerned.
,, repairs.	
Wages.	
Depreciation (not to exceed the amount charged in the valuation).	

In this case also daily records should be kept of the particular work done, and the sections of the farm benefiting thereby.

Garden Tools.—A capital account of these should be kept and the amount representing depreciation written off annually should be debited to the Garden Account, the working of which will follow on the same lines as the other revenue accounts mentioned, and will be comparatively simple in construction.

Repairs to Implements.—If desirable, instead of debiting the various accounts directly with the cost of repairs, the repairs to the various classes of implements may be debited to the capital accounts concerned, and the balance of the accounts, after taking into consideration the depreciation, may be distributed over the accounts which have benefited by the use of the capital assets.

Drainage.—Where a scheme of drainage is carried out which will benefit the particular field drained for several years, the whole expense of carrying out the drainage system should be debited to a special account. The amount standing to the debit of this account should be written off to the particular field drained over a number of years, say five to ten. If the field is used for crops, the various crops accounts will bear the annual charge ; and if used for grazing, the accounts of the various classes of stock grazed will be debited.

Salaries.—Salaries paid to the manager, cost clerk, and farm foreman should be debited to a special account, and the amount standing to the debit thereof should be distributed annually or oftener amongst the various accounts in the cost system. No balance will appear on this account at the end of the year. The basis of apportionment over the various sections of the farm will be a matter for consideration.

Office Rent, and General Administrative Charges.—These charges should be apportioned equitably over the various sections of the farm at the end of the year.

Self-Balancing Ledger.—If on starting the cost system—when the commencing balances are written in—an account corresponding with a capital account as found in the financial books is introduced (which, for this purpose, may be called a Valuation Account or a Valuation Adjustment Account), and if the four books as outlined above have been written up correctly and accounts raised as indicated, the cost ledger will be self-balancing, and will be capable of being proved to have been written up correctly so far as debits and credits are concerned. Before the annual valuations are entered into the various accounts a trial balance should be constructed to ascertain whether or not the ledger does in fact balance. After the valuations are entered up the accounts may be closed.

Closing the Ledger.—The several Adjustment Accounts should be closed and the balances transferred to a Trading or Working Account. Naturally the balances on these accounts will appear (in total) on the opposite side of the ledger to the several balances appearing on the other accounts in the ledger, and the profit or loss as shown by the trading account will likewise appear on the opposite side. This, however, is merely a means of closing the Adjustment Accounts, which are no part of the cost system, but accounts introduced for the purpose of effecting a self-balancing ledger.

The cost accounts may now be balanced and closed to a Costing Profit and Loss Account. In this account the balances will appear on the correct side, and the resulting balance—a profit or a loss—will equal the balance as shown in the Trading Account. This amount should be posted to the Valuation Adjustment Account.

A Balance Sheet or Statement of Balances can now be constructed, so as to complete the whole structure of the cost system, and the result will principally be the following :—

On the Liabilities side will appear the balance of the Valuation Adjustment Account and on the assets side the

APPENDIX I.—COST SHEET: *Grazing Cattle.*

Dr. | *Cr.*

Date.	Particulars.	L.F.	Total.	Special Food.	Wages.	Milch Cows.	General Charges	General	Date.	Particulars.	L.F.	Amount.
			£	£	£	£	£	£				£
—	To Balance (initial cost or valuation) ..	—	600	—	—	—	—	600	—	By Sales	—	400
—	,, Purchases	—	150	—	—	—	—	150	—	,, Valuation.	—	800
—	,, Special food ..	—	50	50	—	—	—	—	—	—	—	—
—	,, Grazing	—	40	—	—	—	—	40	—	—	—	—
—	,, Wages	—	10	—	10	—	—	—	—	—	—	—
—	,, General charges ..	—	50	—	—	—	50	—	—	—	—	—
—	,, Transfers	—	150	—	—	150	—	—	—	—	—	—
—	,, Profit, to Profit and Loss Costing Account	—	150	—	—	—	—	150	—	—	—	—
			1,200	50	10	150	50	940				1,200

NOTE.—These items have been entered up in total. In practice several of them would be entered up in detail. As many more analysis columns as may be rendered necessary may be provided.

APPENDIX II.—GOODS, STOCK, AND STORES RECEIVED BOOK.

Date	From whom Received	Invoice No	L.F.	Total.	Milking Cows.	Grazing Cattle	Sheep.	Horses	Pigs.	1918 Wheat Crop.	1919 Wheat Crop.	Hay Crop.	Barley Crop	&c. &c.

Post in summary form to debit side of Cost Accounts concerned

Post in total to credit side of Goods, etc., Received Adjustment Account.

APPENDIX IV.—WAGES BOOK.

Week ended	Name of Workman	Amount of Wages Sheet.	Turnips	1918 Wheat.	Milking Cows	Hay.	Barley.	Oats.	Potatoes.	Rye.	&c., &c.
		£ s. d.	s. d.	s d							
	James Jones	1 5 9	12 11	12 10							
	Etc.										
	Etc.										

Post to debit of various accounts in periodical totals.

Post to credit of Wages Adjustment Account in periodical totals.

NOTE.—The wages sheets and wages book here outlined may, with slight alterations, serve the purpose of the financial accounts also.

APPENDIX III.—WAGES SHEET.

Week ending............................

Name of Workman, JAMES JONES.

Day of Week.	How Employed.	Wages.	Insurance.
		£ s. d.	s. d.
Monday ..	Hoeing turnips	0 4 3	
Tuesday ..	,, ,, ...	0 4 3	0 2
Wednesday	,, ,, ...	0 4 3	
Thursday ..	Carting manure from piggeries to 1918 wheat field	0 4 3	
Friday ..	,, ,, ...	0 4 3	0 1
Saturday ..	,, ,, ...	0 4 3	
		£1 5 6	0 3
		£1 5s. 9d.	

Summary—	£ s d.
Turnips ..	0 12 11
1918 Wheat ..	0 12 10
	£1 5 9

Signed..................
Foreman.

various valuations as entered on the credit side of the ledger accounts, and these should be carried into the statement of balances in detail. No further notice need be taken of the balance of the Trading or Working Account, this account being no real part of the cost system and it having already served the purpose for which it was created.

Agreement of Cost Ledger with Financial Ledger.—If the financial books have been kept on adequate and scientific lines the profit as appearing in the Costing Profit and Loss Account should equal the profit as appearing in the financial books. When this proof is established the two systems, which in themselves have no relation one with the other, will be absolute proof of accuracy so far as debits and credits are concerned. It is just possible, however, that certain adjustments may be necessary before the two items of profit will agree. No costing system may be said to be arithmetically correct or efficient until an agreement is effected between the two items named.

DRY ROT FROM THE ARCHITECT'S POINT OF VIEW.

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Publications on Dry Rot.—This article does not attempt to deal with the various forms of fungoid growths, commonly called Dry Rot, from the scientific point of view, as these have been adequately dealt with in the issue of this *Journal* for August, 1916, by Dr. P. Groom, and also in Leaflet No. 113 on Dry Rot published by the Board in 1917. Both publications also deal generally with practical points important not only to architects and builders, but also to estate owners, agriculturists and others who may have to erect buildings for various needs.

It may be premised that the average architect possesses sufficient theoretical and practical knowledge of this dread scourge to enable him to avoid methods of construction likely to induce the disease.*

Supervision of Work.—Unfortunately, however, most architects, especially those in the provinces, in most instances through considerations of cost, are not able to employ an efficient clerk of works on the majority of their works to see that all details set out in specification are carried out. The architect himself can only make periodical visits, and there is therefore opportunity for carelessness or neglect, and the contractor himself is in the same position as the architect with regard to personal supervision. Much small detail of the work, therefore, must be executed without direct supervision of the principals intimately concerned, and such supervision consequently falls on the foreman who, probably through ignorance, does not realise the importance of the details in specification directly relating to this particular disease, and unfortunately the majority of the ordinary building artisans are in a similar position. The poor architect, if anything does go wrong,

* Most architects are no doubt familiar with the more general publications dealing with Dry Rot, and in preparing these notes the writer has carefully considered the various points raised by their authors. In particular, the following publications may be mentioned :—

H. Marshall Ward, M.A., F.R.S., F.L.S., *Timber and Some of its Diseases.*
W. H. Bidlake, M.A., A.R.I.B.A., *Dry Rot in Timber*, 1889.
Paul Ogden, F.R.I.B.A., "Report on Dry Rot," *Journal of the Royal Institute of British Architects*, 6th June, 1908.
F. Barnes-Hewitt, F.S.I., "Dry Rot," *Carpenter and Builder*, 20th June, 1908.
Wm. Woodward, F.R.I.B.A., F.S.I., "Dry Rot in Buildings," *Journal of the Royal Institute of British Architects*, 8th January, 1910.

has to pay the penalty, not so much for his own sins of omission and commission as for the acts of those who may have erred through ignorance or carelessness.

Importance of Supervision.—In making investigations extending over a long period in connection with dry rot the writer's experience has been that, in the majority of cases inspected, the work had been carried out without the advice or supervision of an architect. In other instances, more especially those where English timber was concerned, it was noticed that freshly-cut unseasoned material, converted on the estate, had been used principally in repairs to cottages, farm buildings, etc., and the inevitable result was a fine crop of dry rot.

Instruction for Employees, etc.—In order to eradicate this pest it seems essential that all workmen, whether in the building trade or employed as estate workmen, should receive special instruction on dry rot and the preventive measures necessary to obviate as far as possible its occurrence. This instruction should not be confined to carpenters and the like, but be given to all engaged in the building trade, for reasons that must be obvious to anyone with even slight knowledge of building operations. This may possibly be achieved in two ways :—

(*a*) By wide distribution, amongst those already directly engaged in building work, of literature dealing with the subject from a practical point of view. This distribution might be arranged with the co-operation of various bodies interested, such as the Board of Agriculture, the Royal Institute of British Architects, the City and Guilds of London Institute, the Worshipful Companies of Carpenters and Joiners, Bricklayers, etc., etc., the Surveyors Institute, etc.

(*b*) By giving future artisans, etc., instruction on the subject at all technical institutions.

This subject should, in the writer's opinion, be included in the Board of Education's syllabus for the lower examination in building construction, as many artisan students unfortunately do not remain in the schools to prepare for the higher examination, and therefore miss this subject. It would be of great benefit to the country at large and to the building trades in particular if all employees under 18 years of age were compelled to attend technical classes in their working time for a certain number of hours per week. A lad who has had a hard day of manual labour cannot be expected to do his best work at evening classes. The same remark applies equally to evening lecturers, who in many instances have already done more than an eight-hour day before the evening session commences.

It is proposed in this article to set out briefly some of the conditions conducive to the production of dry rot and also to give practical instructions to the worker as to the precautions that should be taken to prevent, as far as possible, its germination and growth.

Conditions Suitable for Producing Germination and Growth of Dry Rot. —It may be taken as an axiom that where dry rot appears its generation is not spontaneous, but the germs of the disease must have been present in some form or other either in the timber or in the surroundings. The development of the dry rot merely indicates that local conditions have either stimulated the germination of the spores of the fungus, or have caused portions of mycelium already present to grow out and cause fresh injury. It is therefore essential that the following conditions should be either avoided or overcome in any building :—

(*a*) Damp sub-soil causing damp foundations, etc.

(*b*) Vegetable matter, roots, cuttings of trees, shavings and waste pieces of timber buried in sub-soil or left under floors.

(*c*) " Making-up " under ground floors with ordinary excavated material, which may contain germs of disease, instead of using hard impervious dry core.

(*d*) Improper stacking of timber both in stock-yard and on site of building, especially if timber is of English growth.

(*e*) Use of timber stacks and interior of new buildings by insanitary workmen as " conveniences."

(*f*) Warm, moist, stagnant atmosphere likely to be found under floors and in cellars where ventilation is imperfect.

(*g*) Use of unseasoned or immature timber.

(*h*) Use of infected timber. Timber may become infected on board ship and in the merchant's and builder's yard, or may have been converted from trees attacked by fungus growths in the forest.

(*i*) Direct communication between timber and walls recently built which necessarily contain moisture.

(*j*) Use of impervious floor coverings such as oilcloth, cork carpet, etc., which cause condensation and prevent free circulation of air.

(*k*) Painting, etc., on unseasoned timber so that moisture is confined in the wood.

(*l*) Stoves, ranges and hot-water pipes under floors where surrounding air-spaces are not efficiently ventilated.

(*m*) Imperfect removal of infected timber, etc., the spores and mycelium remaining, even though in brickwork or concrete, producing a recurrence of the disease.

(*n*) Carriage of spores, etc., from infected material to timber stacks, and also to freshly-worked material by carting infected material to builder's yard or by non-cleansing of tools used in removing infected timbers, etc.

Measures of Control.—*Preventive.*—The following instructions if carefully carried out would to a large extent prevent the germination and growth of dry rot, and should be carefully studied not only by architects but also by timber merchants, contractors, estate owners, farmers, and all workmen who may be concerned in building operations.

1. Make careful inspections of all fresh cargoes of timber as soon as unloaded.
2. Make careful periodical inspections of all timber in stock-yards and test by gimlet, auger, appearance and odour whether indications of disease are present.
3. It is a common practice to convert trees having rotten butts after cross-cutting the diseased portion. If timber from such trees be carefully examined, distinct traces of *hyphæ* may be found, in some instances extending almost to the tip of the tree. The writer has condemned quantities of converted English timber felled during War-time for this very reason. Any tree found with rotten butts should be utilised for firewood only. Carefully examine all timber for traces of red stripe and discard any showing signs of same.
4. Remove all vegetable matter from site and do not use any excavated material likely to contain vegetable matter for "filling" under solid floors. "Filling" or "making-up" should be of clean ballast or some such non-porous material, and broken brick, chalk or porous stone only used where non-porous material is not available.
5. Materials suitable for foundations are dealt with in Leaflet No. 113 issued by the Board of Agriculture and Fisheries.
6. Always construct the sleeper wall adjoining main wall as an independent wall, as in illustration "A." This prevents contact of plate with main wall, and ends of joists and boarding should have a clearance as shown. On no account build in ends of timbers on ground floor, but always support on sleeper wall.
7. For cheap work 9-in. brick in cement piers may be constructed at 5-ft. centres, and bearers carried on same to support 3-in. by 2-in. to 4-in. by 2-in. joists, as in illustration "B."

8. Do not fix any timbers in building until absolutely essential, so as to allow walls, etc., the maximum amount of time possible for drying out. Use well-seasoned, dry timber and keep same dry.
9. Do not allow any timber to be in contact with walling or mortar wherever a clearance can be given, as illustration "C." Where it is essential to bed ends of timbers in wall, treat ends with carbolineum or other preservative, and form pocket whole length of wall with damp-course, as illustration "D," and fill in between timbers as they are inserted and pin up in cement.
10. Avoid dampness in walls and damp and stagnant air under ground floor by :—

(*a*) Inserting impervious damp course of good quality throughout entire thickness of all walls at least 6 in. above ground line.

N.B.—Tarred brown paper is worse than useless as a damp course. Instruct occupier of house that in making up garden, etc., no earth should on any account be above damp course level.

(*b*) Where soil is naturally damp, cover whole surface of site with 4-in. layer of cement concrete after removing top soil. This bed of concrete should have upper part composed of fine stuff and finished off with hand float. Surface concrete made with a large aggregate and left with rough surface must be avoided.

Provide ample ventilation as hereafter described, otherwise surface concrete may cause condensation on under side of floor and so tend to start fungoid growth.

See that all guide-pegs are withdrawn from concrete and holes filled up. Pegs *must not* be left in permanently.

(*c*) Where any floor is below ground level arrange for dry area all round or insert vertical damp course, as shown in illustration "E," and use solid floors.

(*d*) Provide ample ventilation under all floors by means of air bricks in external walls, not less than 9 in. by 6 in., as shown in illustrations "A" and "B."

Leave ample openings in all internal walls and build all sleeper walls honeycomb to ensure thorough circulation of air. Use simple-pattern air bricks with maximum-size apertures possible.

Where party walls or solid floors intervene obtain through current of air by laying 6-in. socketted drains as connecting flues.

See that all air bricks are clear of obstructions and do not block them internally by placing end joists close against wall, where height of floor above gronnd necessitates joist being at level of air brick, but allow clearance as in illustration "F."

Instruct occupier of house that air bricks under floors do not cause draughts in rooms above and therefore must on no account be blocked up.

It is essential that there should be no stagnant air under floors, and efficiency of ventilation may be considerably

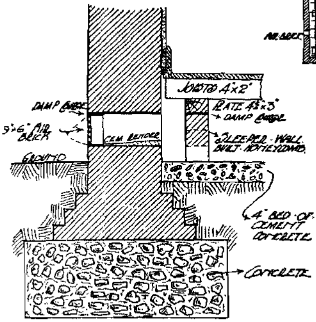


ILLUSTRATION "A"

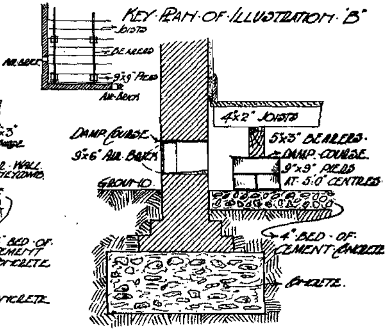


ILLUSTRATION "B"

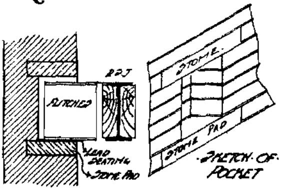


ILLUSTRATION "C"

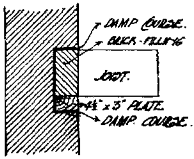


ILLUSTRATION "D"

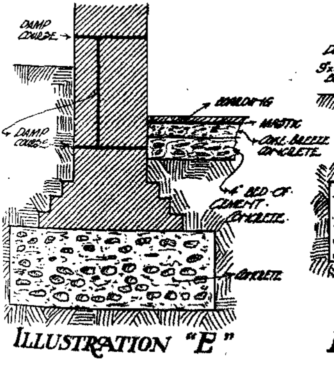


ILLUSTRATION "E"

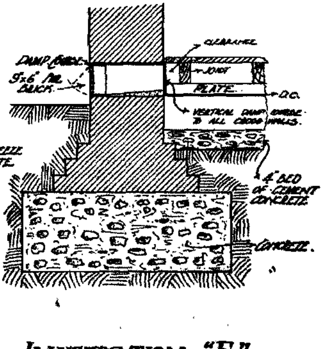


ILLUSTRATION "F"

Fig. 1

increased by building air flues in chimney-stack separated from smoke flue by stout tile or iron wyth, or by carrying up in walls Haden's or other approved ventilating flues or butt jointed pipes as extract flues, as in illustration "G." These flues must be placed in such positions as will ensure through circulation, and should be finished at roof level with 9-in. by 6-in. gratings in open air and not in roof.

The writer has in many cases inserted simple 4-in. galvanised pipes in existing buildings as extracts, which have proved very efficient in increasing circulation and curing dampness.

11. Where surface concrete is compulsory under local bylaws it is cheaper and better to lay boarding in an approved mastic and nail directly into coke breeze, as in illustration "H," than to bed fillets in concrete or to use small joists.

12. Remove all shavings, chips, etc., from under floors whilst boarding is laid where joists are used.

13. Where hot-water pipes of any description are laid under boarded floors :—

(a) Form proper brick channels and pack pipes with silicate cotton or other approved insulating material and cover in channels ; or

(b) Coat pipes with an approved non-conducting covering and provide extra ventilation in external walls and hit-and-miss gratings over pipes in floor boarding or skirting.

If gratings are inserted in skirting proper flues must be formed to them.

14. Avoid use of linoleum, cork carpet, or similar impervious floor-coverings on ground-floor boarded rooms.

If these coverings are insisted on by occupier a clear border of a minimum width of 6 in. must be left all round room.

15. For preserving ends of timbers, etc., avoid paint and tar which are impervious and not only prevent ingress of damp but also prevent egress of moisture latent in wood which thus confined is likely to cause decay. Use carbolineum, etc., as described under No. 9.

16. Avoid paint or similar impervious priming on backs of panelling, dadoes, skirtings, etc., for same reason, and coat with carbolineum or similar preservative. Bore holes at top and bottom of dadoes, etc., for ventilating space at rear.

17. Carry first coat of plaster behind panellings, dadoes, skirtings, etc., but if patent impervious plaster is being used above dado, etc., the coating behind should be ordinary lime plaster. The latter material is porous and will therefore absorb moisture and prevent excessive condensation.

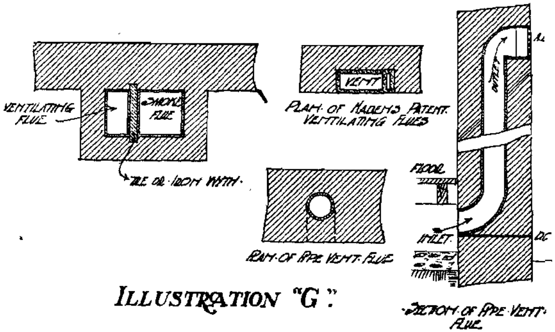
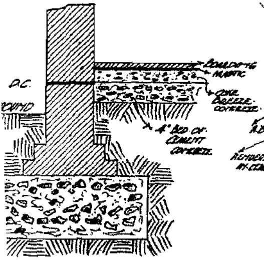


ILLUSTRATION "G."



LUSTRATION "H"

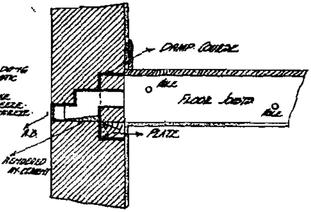


ILLUSTRATION "I"

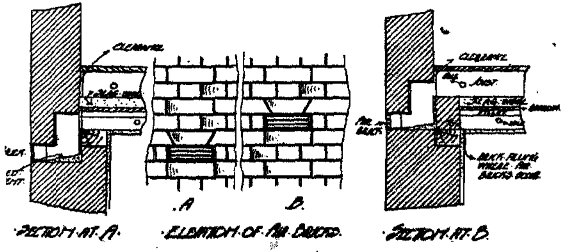


ILLUSTRATION "K".

FIG. 2.

18. For the same reasons ordinary lime plaster is preferable for use on wood partitions and ceilings supported by timber construction, especially if spaces between timbers are not ventilated.

19. Use breeze or similar patent fixing bricks for securing all grounds and joinery, and avoid wood bricks and pads.

20. On upper floors or flat roofs the following precautions should be taken :—

(*a*) Ventilate by 9-in. by 3-in. airbricks having cranked flues rendered to fall to throw rain, etc., outwards, as in illustration " I." Bore occasional holes in joists to provide for through circulation of air and leave suitable openings in internal walls for same purpose.

If latter is impossible, form suitable vertical extract flues, as described under 10 (*d*).

(*b*) Where joists are not bedded in walls leave clearance at ends.

(*c*) Always treat ends of timbers bedded in walls, especially those occurring in hollow walls, with preservative, as described under 9.

21. Where pugged floors are constructed the following precautions should be taken :—

(*a*) Avoid lime or moist pugging of any description and use either fibrous plaster slabs, silicate cotton, or other approved non-conductor of sound.

(*b*) Provide ventilation both *under and over* pugging with air bricks, flues, etc., as described under 20 (*a*), and as in illustration "K."

(*c*) As floor boards on upper floors in all but cheap properties are usually close jointed in some form or other, ventilation through joints must be considered impossible.

22. Special supervision must be exercised by the foreman in relation to sanitation. A notice should be posted on all buildings in course of erection stating that any workman found using wood stacks or interior of building as a " convenience " will be instantly dismissed.

23. Any workman engaged in removal of material infected with dry rot must carefully cleanse all tools used in the work in a suitable disinfectant before leaving the premises.

All infected material removed must be burnt on the site and not taken off the premises.

Aprons, etc. should also be soaked in disinfectant and rough dried before being taken away.

Remedial Measures.—These are fully dealt with in the Board's Leaflet No. 113.

English Timber.—Owing to the War, English timber of various kinds has been used in large quantities, not only for war purposes but also for ordinary building work throughout the

country. The writer has inspected large quantities of this material and is of the opinion that a few notes may be of use to estate owners and agriculturists generally, and possibly to those more intimately concerned with building operations. In speaking of English timber reference is intended to soft woods such as Scotch fir, silver fir, spruce, larch, Corsican pine, etc. Much of the timber already converted has been cut out of

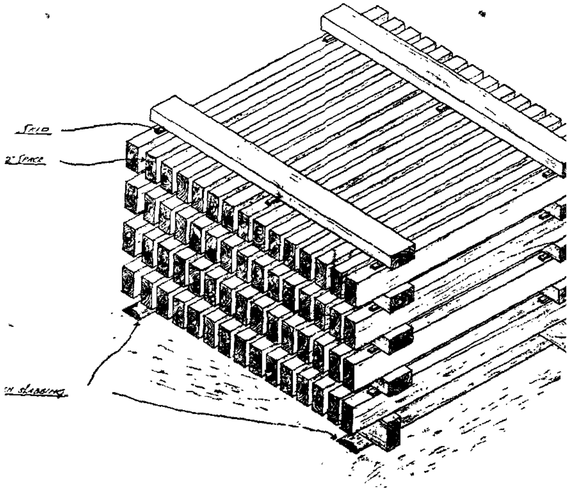


FIG. 3.

season; it is therefore full of moisture and, owing to urgency of demands, has to be used in that condition. It is improbable that imported timber sufficient to supply all requirements will be available immediately at the close of war, but there may be large stocks of English material in hand unless war demands have exhausted the supply. It is most likely that many persons ignorant both of the necessity for proper seasoning and the danger of dry rot may see no harm in using such timber for ordinary building operations. There is in many distrcts English timber of excellent quality which if properly treated would be suitable for really good-class work. From observations

made in various parts of the country the writer came to the conclusion that two errors seemed fairly general, viz.:—

(1) Timber converted without any consideration as to sizes likely to be of use to the building trade;

(2) Timber stacked in most cases in the open and in the same manner as imported timber.

These points have been remedied in some instances, but if English timber is to be of permanent use it is essential that the needs of the purchaser are considered not only as to sizes but also as to quality, which is directly affected by methods of stacking. All English timbers should be seasoned by "open" piling or stacking, and a diagram (Fig. 3) illustrating this method was issued by the Board through the Home Grown Timber Committee, and copies should be obtained by all estate owners who are cutting and converting timber on their estates.

If English timber is improperly stacked, especially when cut out of season, discoloration and signs of fungoid growth appear very quickly and whole stacks of material may soon be infected. If, however, care is exercised in piling, the material is stored in open sheds, and all trees showing signs of incipient decay in the butt are discarded, good quality timber should be obtainable subject to the proviso before mentioned. The writer has seen roof principals, floor joists, etc., of local-grown Scotch and silver fir as clean and bright as they were when put in over 20 years ago, and there should be no reason why similar good material cannot still be produced.

THE SHORTAGE OF CLOVER SEED IN ESSEX IN 1917.

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IN August, 1917, the poor crops of clover seed in Essex roused suspicion in the minds of growers that the dearth of bees might be the cause of the seed shortage; and in answer to an inquiry the following notes on the subject were written:—

The failure of clover plants to produce seed is to be considered from at least two points of view, viz.,

1. The pollination of the flowers by insects, and
2. The destruction of the seed by insects.

1. **Pollination of the Flowers.**—The pollination is mainly effected by insects belonging to the bee family, of which humble

bees and honey bees are the most important as pollen carriers. The Isle of Wight disease has caused the death of most of the honey bees in Essex, and the writer has heard a bee expert say that humble bees and wasps are also susceptible to the disease, and that the former at any rate have been decreased in numbers as a result. The writer has not himself noticed any diminution in the number of humble bees.

Darwin's experiments on clovers may be summarised as follows :—

Plant.	Seed Production of Plants Covered with Muslin to Prevent Access of Insects.	Seed Production of an Equal Number of Flowers Unprotected.
Red Clover (*Trifolium pratense*)	68	2,720
White or Dutch Clover (*Trifolium repens*) ..	As 1	is to 10
White or Dutch Clover (2nd experiment) ..	0	2,290
Crimson Clover (*Trifolium incarnatum*)	63	349

The insects which visit clover flowers for the purpose of sucking honey or collecting pollen are given as follows by Müller :—

Clover.	The Bee Family.			Flies.	Moths and Butterflies
	Honey Bees.	Humble Bees.	Other Bees.		
White Clover (*Trifolium repens*) ..	Very abundant	1 kind	4 kinds	3 kinds	1 kind
Red Clover (*T. pratense*) ..	some	14 kinds	14 kinds	3 kinds	8 kinds
Hare's-foot trefoil (*T. arvense*) ..	present	2 kinds	9 kinds	..	1 kind

With regard to *Trifolium repens* there is a general concensus of opinion that the honey bee is the most important pollen carrier.

In the case of *Trifolium pratense* Darwin remarks, "it is at least certain that humble bees are the chief fertilisers of the common red clover." In this flower the honey lies at the base of the tube 9 to 10 millimetres long and the mouth tube of the honey bee is only 6 millimetres long, too short, therefore, to reach the honey. It is recorded that in the United States

and in New Zealand honey bees do not visit red clover ; Müller remarks that in Germany "the honey bee usually visits the red clover only for its honey which its proboscis is not able to reach in the legitimate manner—yet I have now and then seen hundreds of honey bees on a patch of red clover, all busy collecting pollen." Darwin's experience is different from the above, and apiarians generally consider that the red clover is of no use to their bees. Sladen writes : "In consequence of the absence of *humble* bees in New Zealand it was found that the red clover did not produce seed freely. So in November and December, 1884, a number of queens were sent from England to that country, with the result that two species have become established there, and the red clover now yields a plentiful crop of seed."

From the above data it is clear that any shortage of seed in the case of *Trifolium repens may* be due to the death of the honey bees, but in the case of *Trifolium pratense*, the presence or absence of the honey bees would make no appreciable difference. If, however, the humble bees were less plentiful than hitherto, the pollination of the clover in question could not be properly effected, and a small yield of seed would be the result.

2. **Destruction of the Seed by Insects.**—Considering the matter from the second point of view we know that in 1917, beans, peas and clover were much eaten by *Sitones* beetles, which notch the leaves of these plants every year. They are not, however, responsible for any direct loss of seed as they feed on the leaves of the plants. Last year they were the companions of a very destructive weevil (*Apion apricans*, Herbst.) ; whilst the *Sitones* beetle was eating the leaves of the clover the weevil named was laying its eggs in the flowers. When the first crop of clover was cut and stacked it was discovered after some days that millions of insects (weevils) were issuing from the majority of the stacks, and were eating the clover in the vicinity. The young clover around the stacks had the appearance of being burnt, and each day the "ring" round the stack increased in area. The weevils got into the stacks in the following way. Whilst the clover was in flower in May and June the weevils laid their eggs in the flowers. When the clover was cut the young weevils resulting from the eggs were in the maggot stage, but the cutting and stacking of the clover did not prevent them from completing their metamorphosis. Every maggot, therefore, which went into the stack gave rise in a few days to a weevil.

When the young weevils issued from the stacks in immense numbers, they ate up the first clover plants in their way, and then passed on into the field to lay eggs for the next generation. Every head of clover in which eggs were laid would produce few or no seeds. The number of weevils was very large, and the damage they would do would be correspondingly great ; in fact, many farmers fed off the second crop or cut it for hay as the promise of seed therefrom was small.

Though the weevils have wings they prefer to *walk* from the stack, and sticky cloths caught large numbers on their outward journey. In the case of one stack, bands of cloth were stretched round like a little fence, half of the length being coated with "Tanglefoot," and half with coal tar and pitch. The latter mixture seemed to be the more effective, as the heat caused the "tanglefoot" to melt and run down to the ground. The experiment sufficed to show that a trench with water and tar would catch the majority of the weevils. The water would prevent the tar soaking into the dry soil and becoming ineffective.

Curtis records several cases of loss of seeds due to this weevil :—

(*a*) In 1798 4½ acres produced 16¾ bush. of seed ; in 1800 the same ground 7½ bush., the pest being the clover weevil in question.

(*b*) Another grower stated : "I reckon my loss in the seed crop in 1841, by the clover weevil, at one-tenth." The agriculturists complained later that the yield of seed was far from abundant.

In conclusion, when the dearth of honey bees is considered along with extraordinary numbers of clover weevils in 1917 there is little doubt that the shortage of seed was due to the depredations of the latter ; and it behoves farmers to adopt measures to prevent the egress of the second generation of weevils from their stacks of first-cut clover. Nevertheless, the importance of honey bees and of humble bees must not be overlooked, for there is little or no seed formation without them.

An Experiment in Pig Feeding.

THE following notes on an experiment on the cost of feeding a herd of 11 sows and their produce for the 6 months, October, 1917, to April, 1918, under war conditions, have been received by the Board from a Suffolk farmer, and are published as an interesting historical record* :—

* The result is perhaps more encouraging than the experimenter implies, as he would appear to have obtained good profit through the prices charged for some crops grown by himself. The potatoes, however, were purchased. The cost of production may possibly be higher next winter.—*Ed.*

"Most of the sows are pure Large White sows, and the boar is one-fourth Berkshire and three-fourths Large White.

"Most of the profit shown (£141 8s. 3½d.) is accounted for by the valuation of October being on the basis of 25s. per score and that of April 28s. per score.

"Also the pigs were carefully bred and exceptionally well-managed by the farm bailiff, and all of them were thrifty and free from disease or accident for the whole period.

"The average loss through death and disease would probably do away with the rest of the profit, so I come to the conclusion that, where the management is good and the stock of pigs is carefully selected and crossed, the price of 28s. per score will just pay expenses, but offers little inducement to farmers who are not experienced in the management of pigs to start pig-keeping. From a food production point of view, however, the figures show very good results for war-time.

"In order to produce 1 lb. of pork, 3 lb. of concentrated food and 20 lb. of vegetable food were consumed, and none of the concentrated food was suitable for human use.

"In a former experiment on the same lines (made before the War) when the pigs were fed entirely on meal, 1 lb. of pork was made by the consumption of 5 lb. of meal.

"To show the ratio of pork produced to food consumed it was necessary to make the valuations on a dead-weight basis, and these valuations were made by one of the best judges in the Eastern Counties.

"In estimating the dead weight of heavy sows, an allowance was made for the unborn pigs. I believe that a much nearer estimate of the dead weight of pigs can be made by the careful valuation of a good judge than by weighing alive and then calculating the dead weight, because the proportion of dead to live weight varies so much in different stages of maturity that live weights are very unreliable, except for mature pigs. I also think that most experiments on pigs are very misleading, because the pigs are shut up in confined places and weighed so often that they do not thrive in the same way that they would do under natural conditions, and if the 'nerves' of pigs are upset, they will not pay for the food.

"Nearly all the pigs sold went to a bacon factory in the Midlands, which reported that the pork was of first-class quality. They weighed from 150 lb. to 220 lb. each. The following figures are of interest :—

Concentrated Food Used.	Tons	cwt.	lb.	*Price per cwt.*	£	s.	d.
					Value.		
Barley meal	2	19	70	18*s*.	53	13	3
Bran	1	8	84	15*s*.	21	11	3
Pollard	2	8	42	16*s*.	38	14	0
Wheat germ	0	15	0	20*s*.	15	0	0
Bates cake meal	0	11	0	24*s*.	13	4	0
Soya bean meal	0	16	56	24*s*.	19	16	0
Coco-nut cake	3	10	0	20*s*.	70	0	0
Palm kernel cake	1	12	28	16*s*. 6*d*.	26	12	1½
Fish meal	1	14	14	23*s*.	39	4	10½
Tail red clover seed	1	17	0	19*s*.	35	3	0
	17	12	70		£332	18	6

Vegetable Foods.	Tons	cwt.	lb.	*Price per ton.* £	s.	d.	*Value.* £	s.	d.
Acorns	5	13	0	6	15	0	38	2	9
Savoys	2	5	0	3	0	0	6	15	0
Carrots	0	17	0	2	10	0	2	2	6
Kohl Rabi	65	3	0	2	0	0	130	6	0
Potatoes	25	15	0	3	5	0	83	13	9
Mangolds	19	10	0	1	10	0	29	5	0
							£290	5	0

Result.	Stone	lb.
Weight of pigs sold October to April	788	11
Weight of stock pigs 3rd April	656	0
	1,444	11
Weight of stock 10th October	513	11
Weight of pork produced 10th October to 3rd April	931	0

That is, 931 stones of pork dead weight (14 lb. stone) were produced for the consumption of 17 tons 12 cwt. 70 lb. of concentrated foods and 119 tons 3 cwt. of vegetable foods.

That is, 3·035 lb. of concentrated food and 20·476 lb. of vegetable foods produced 1 lb. of pork.

Profit and Loss Accounts.

Dr.	£	s.	d.	*Cr.*	£	s.	d.
Valuation 10th October	481	10	0	Pigs sold October to April	714	3	6
Concentrated foods	332	18	6	Valuation 3rd April	646	18	3½
Vegetable foods	290	5	0				
Labour and feeding	39	0	0				
Expense of boiling	26	0	0				
Establishment charges—							
Rates, rent and taxes	25	0	0				
Interest	15	0	0				
Management	10	0	0				
	£1,219	13	6				
Profit	141	8	3½				
	£1,361	1	9½		£1,361	1	9½

Profit accounted for by the valuation of October being made at 25*s*. per score, and that of April at 28*s*. per score, and also by there being no loss by death or disease.

"The pigs on this farm were better managed and were more thrifty than those on any of my other farms. The cost of litter and labour on carting it was off-set against the value of the manure."

THE poultry-keeper, in common with all owners of stock, is faced with great difficulties in securing suitable feeding materials for his stock.

The Feeding of Poultry.

The conditions which have produced these difficulties are described and advice as to how they should be met, are given in the following reply by the Rt. Hon. R. E. Prothero, M.P., President of the Board of Agriculture and Fisheries, to a Petition on behalf of poultry-keepers presented by Mr. E. Jardine, M.P. :—

"At the beginning of the year a careful estimate was made of the amount of concentrated food for live stock of all kinds that we have or shall have in the country between now and the next harvest. This stock-taking includes the oil cakes existing and likely to be made within the period, the oats, tail corn and damaged grain in farmers' hands, the millers' offals that we may expect, the imported grain materials that will have to be rejected as unfit for human consumption—in fact all the larger items of food for live stock which can be brought under Government control. The account revealed an alarming deficiency, and the Board of Agriculture, with the Ministry of Food, had to consider what classes of animals should be served first. It was found that after the working horses on the farms, in the pits, and in the towns had been provided with a bare ration, and when the milch cows had been given sufficient to carry them on until they could maintain themselves upon the grass, there was but a small margin left. That margin has been divided between pigs and poultry. Nothing at all has been allotted to fattening cattle or sheep.

"That is the situation. **There is not enough food to carry on the business of poultry-keepers or any other class of live stock keepers** *in the ordinary way.* **Nothing that the Board of Agriculture can do will remove the shortage or create food where it does not exist.** The reason that even the allocation of 1 oz. a day per hen bird, together with a reservation of food for utility birds, has been allowed to poultry, is that poultry can to a large extent be fed upon waste materials from the household and the farm by people who are suitably circumstanced, if they are provided with just that minimum of concentrated food which they need to carry poultry through the critical period when they are chicks, and to supplement the food at other periods.

"***If poultry-keepers will lay themselves out to produce eggs under these conditions, and exercise their ingenuity to make use of every sort of food they can get at, except those I have mentioned***

above, the Board of Agriculture wish to see every possible fowl kept; but they are unable to accept the suggestion contained in the Petition, that poultry-keepers should be supplied with food in the usual way, for the simple reason that it is not there to give them. When your Petitioners state that 4 lb. weight of poultry flesh can be produced in 16 weeks they omit to set down the other side of the sum, namely, the quantity of grain which is consumed in producing this poultry flesh. In so far as the poultry-keepers of the country can make this flesh out of waste, together with the damaged grain, screenings and the like, which has been promised to them, no one is more anxious than myself for their success, but I cannot encourage them for a moment to suppose that they can be allowed sound grain or any of the other materials utilisable for human food, or even that they can be permitted to trench upon the stock that is required for the working horses and the milch cows."

The Present Position.—The position with regard to the use of the ordinary feeding stuffs for poultry may be briefly summarised as follows :—

Wheat, barley, rye, rice and dredge corn may not be used unless declared unfit for human food.

Maize may be used if obtainable, but supplies are extremely scarce.

Butter beans, haricot beans, blue and green peas, lentils and *yellow split peas* may not be used. Other kinds of beans, peas or pulse may be used.

Oats are not at present prohibited, but supplies are so short that it is in the national interest that they be used with the greatest economy.

Tailings and *screenings* from all kinds of grain may be used.

Oil cakes, milling offals and *other meals* (except oatmeal), and *proprietary poultry mixtures* prepared in accordance with the provisions of the Horse and Poultry Mixtures Order (1917) may be used.

The Scheme for Rationing Poultry.—Practically all the foodstuffs in the foregoing classes are placed at the disposal of the Central Rationing Committee of the Ministry of Food, who have appointed Provincial Feeding Stuffs Committees to apportion them to the different classes of stock in definitely fixed quantities.

An Order will shortly be issued by the Ministry of Food under which poultry-keepers may obtain priority certificates entitling them to purchase from their usual corn dealers 1 oz. of oats per hen (hatched since 1st January, 1916) per day, or an equivalent value in other foodstuffs. ***Supplies cannot, however, be guaranteed, but poultry-keepers will be in the same position as owners of milch cows and pigs.***

Poultry-keepers may supplement this ration from any stocks they happen to hold, and by the purchase of parcels of suitable foodstuffs the supplies of which are so small that they are not caught up in the schemes for the control of the main animal feeding stuffs.

In addition, a scheme is under consideration by the Ministry of Food and the Board of Agriculture for the distribution of 50,000 tons of foodstuffs for the preservation of the best utility strains of poultry from which the country can be re-stocked. It is hoped that details of this scheme will shortly be published in the Press.

Grain Feeding.—Owing to the demands of human beings for bread it has been increasingly difficult during the War to provide a suitable and sufficient hard corn ration for poultry. Before the War, 2 oz. of grain per head per day was the generally accepted ration for adult poultry.

The scarcity and high price of grain have compelled many poultry-keepers to reduce this ration considerably.

One skilled poultryman obtained excellent results from a ration of ½ oz. of grain per head per day supplemented by an increased amount of mash composed of meals and a large proportion of boiled vegetables and roots.

Other instances have been brought to notice in which fowls have been fed entirely on soft food.

Poultrymen will, no doubt, do their best to obtain their 1 oz. per hen per day ration in the form of some kind of grain, but they must face the fact that this will not always be possible. They should, therefore, use any grain they obtain, or which they have in hand, most sparingly, in order to provide for periods when no grain may be obtainable.

Mash-Feeding.—Fortunately the foodstuffs available for mash-feeding are more plentiful and are not so keenly competed for by other classes of stock. The "ration" may be supplemented from the following foodstuffs :—

Fish-meal.—This is still procurable in fair quantities. Recently a fish-meal has been placed on the market containing such a high percentage of salt that it caused the death of many fowls to which it was fed. A guarantee should, therefore, be obtained from manufacturers or vendors that the fish-meal they sell contains less than 5 per cent. of salt.

Blood-meal, Meat-meal, Bone-meal.—These are still available from the usual sources, and, in addition, many local authorities are manufacturing or preparing to manufacture these meals

from the edible refuse which they collect from abattoirs, hotels, infirmaries, houses, etc. *Waste vegetable matter* is also being dried and pulverised. These foods will be sent out in dry condition, and should be extremely useful to poultry-keepers.

Blood (boiled) and scraps from butchers, and horseflesh where obtainable, are also most useful. Where arrangements are not made by local authorities for the collection and treatment of household waste, poultry-keepers might well combine to organise house-to-house collection by means of boy scouts and school children, at frequent intervals, in order that the waste may be received and used in as fresh a condition as possible.

Fodder Meals.—Some of the ordinary farm fodders when ground give very useful meals. The best known is clover-meal, which is highly valued and extensively used by poultry-keepers. Lucerne (alfalfa) and sainfoin are similar in character and give equally useful meals. The clover leaves obtained as a waste in the threshing of clover seed are very useful where they can be collected. The seed heads of the leguminous plants mentioned make good food either fresh or dried, as do the ripe seed heads of many of the grasses.

Surplus Garden Produce.—All kinds of greenstuffs and roots can be utilised to a certain extent. In the case of roots (small potatoes, turnips, mangolds and carrots) these should preferably be boiled before use. It should also be borne in mind that many weeds, such as dandelions, chickweed, groundsel and the seed-heads of other weeds may be used.

Bracken Meal.—Good results have been obtained with meals prepared from the dried young fronds and root stocks of bracken.

Heather Meal.—The leaves, flowering seeds and fine stalks of heather furnish useful food.

Couch Rhizomes.—The long, creeping underground stems of couch (" twitch ") which give so much trouble in the cultivation of land in many districts, contain a considerable amount of useful food. They should be collected, washed, dried in the sun and cut into fine chaff, or, where facilities exist, ground into a meal.

In all cases where new or unusual foods are tried they should be introduced gradually, and the feeding modified according to the results obtained.

At the present time it is of little use to give any conventional recipes for mashes, as it is probable that the ingredients recommended would often be unobtainable.

One sample, however, of the successful use of garden waste is worth quoting—90 per cent. of cabbage leaves and 10 per cent. of meat meal were boiled together; the cabbage was then chopped fine, and the mash dried off with sharps or any meal obtainable.

In ordinary times it is generally accepted that a mash should not contain more than 25 per cent. of boiled vegetables, but it is obvious that during the summer the quantity must be exceeded when meals are unobtainable.

Owing to the scarcity of milling offals it appears probable that "dry mash" feeding must be abandoned.

Green Food.—All foodstuffs should be economised by liberal feeding of garden waste in its green state. In this respect lawn-clippings are valuable.

Points to be Noted.—(1) At a time like the present great care should be taken to ensure that nothing is wasted.

(2) Food given should be supplemental to that which fowls can obtain by foraging.

(3) After harvest, poultry should be given the run of the stubbles to enable them to utilise waste grain.

(4) All mashes should be fed in troughs.

(5) Grain, except where buried in the litter, should be fed in the same way.

(6) All foods should be stored in rat-and-mouse-proof bins or boxes, since these vermin cause great loss, not only consuming large quantities, but spoiling a great deal more than they eat.

(7) Sparrows, which are probably the biggest robbers of poultry food, should be kept down.

This article is also issued in the form of Leaflet No. 114 as re-written.

Notes on Poultry Feeding:
From the Harper Adams Agricultural College, Newport, Salop.

CONSIDERABLE shortage of poultry feeding stuffs is general, more particularly amongst those that go to form the largest bulk of the mash feeds during normal times.

Sharps and bran are now entirely unobtainable in any quantity by the average poultry-feeder, which has necessitated increased replacement by substitutes.

Biscuit meal has also almost entirely disappeared from the market. Palm kernel meal has proved to be one of the most valuable ingredients of the mash for the replacement of the

cereal offals, as will be instanced by the following dietary, upon which it has been possible to maintain high laying capacity (up to 3,000 eggs per week) from 700 birds on grass runs :—

		Price per cwt. s.	d.
Sharps	1 part	17	6
Bran	⅛ ,,	14	9
Fish meal	1 ,,	22	3
Compound meal (chiefly palm kernel)	3 ,,	16	6
Maize meal	1 ,,	22	5
Clover meal	$\frac{1}{10}$,,	12	0*
Coarse ground oats	¼ ,,	18	0
Meat meal	½ ,,	23	3

* Carriage forward.

The fall in the proportion of sharps from 55 per cent., as recorded in the last report,* to about 10 per cent. in the above mash formula, with the corresponding increase of palm kernel meal from 5 per cent. to about 30 per cent., are the most noticeable features of the present feeding.

Supplies of clover meal, while not showing any appreciable advance in price, have been more difficult to obtain in quantity, and this accounts for the reduction from about 11 per cent., as recorded in the previous report, to about 1 per cent. in the above mash. Reduction of clover meal during the present period is justified by the availability of plenty of young herbage at this season of the year, but in view of the value of this and similar (*e.g.*, alfalfa) meals, both for replacing green food and for maintaining the high protein content of the food of the laying hen, the increased production of leguminous and pulse crops by all poultry-keepers who have facilities for growing them is highly desirable during the present season.

Recent results obtained in the feeding of laying hens in New Zealand have shown that excellent results can be obtained in the matter of egg yield by the feeding of a ration containing up to about 25 per cent. of lucerne (or alfalfa) meal.

Attention was called in the previous report to the dustiness of many samples of clover meal offered for sale in this country. It is also noticeable that many supplies contain a large proportion of parts of non-leguminous herbage, chiefly stalks and seeds of many of the common grasses. Where such is the case, the value of the sample for purposes of poultry-feeding must be considerably reduced, the grasses having ripened before the time of cutting.

* This *Journal*, January, 1918, p. 1105.

In another case, involving 500 birds under large house conditions, the feeding has been on a different system, both dry and wet mash being used. The allowance of food has been strictly in accordance with the scale laid down of 4 oz. per head per day, including 1 oz. of grain. The egg yield under these conditions during March averaged for 500 birds of mixed breeds, 12 eggs per four weeks, and the money return per bird was 3*s*. 4*d*. The food consumed was 7 lb. per bird for four weeks at a cost of 1*s*. 5½*d*. Care was taken to make the utmost use of the grain by feeding in the litter each morning and well raking in. The later feeds of the day consisted of dry mash at noon and wet mash in the evening, using the same ingredients as set out in the mixture given above.

Notes on Feeding Stuffs in June: *From the Animal Nutrition Institute, Cambridge University.*

THE amount of feeding stuffs reaching the markets is still very limited, and market reports indicate that the situation as to supplies is not likely to be relieved during the coming month. Moderate quantities of palm nut cake, linseed cake and maize gluten feed and peas are to hand, and such supplies as are available should be reserved for the more important classes of stock.

The policy of the farmer should be directed to such modifications of his farming practice as will tend to make him more and more independent of purchased feeding stuffs, which should be regarded as adjuncts rather than essentials to any system of feeding practice.

In this respect, the possibilities of increased production of home-grown foods by the more extensive cultivation of forage crops and the use of silage should not be overlooked. An article dealing with this subject appeared in the March number of this *Journal* and should be consulted by persons interested.*

The system of allocation of concentrated feeding stuffs to the more essential classes of live stock by the system of Priority Certificates seems to be generally appreciated, and farmers on the whole have endeavoured to carry out in practice the policy indicated by the Board of Agriculture and the Ministry of Food. It is feared, however, that a small minority are still using feeding stuffs for other classes of stock than those covered

* See also p. 149 of this issue.

by the priority system, and it may become necessary to issue Orders constituting such action a penal offence.

The question of the provision of fodder, in view of the breaking up of extra grass land, and the demands of the Army, is an increasingly important one, and the farmer's energies should be directed to accumulating as far as lies in his power a big reserve for the coming year. A shortage in this respect would prove much more serious than the present deficiency of concentrated feeding stuffs, and by necessitating a considerable depletion in our live stock population would contribute far more towards the crippling of national efficiency than any amount of unrestricted U-boat warfare. Every endeavour should, therefore, be made to make up the deficiency of fodder, resulting from the decrease in acreage under grass, by the cultivation of quick-growing fodder crops in the coming summer months.

Horses.—Although agricultural horses are specifically exempted from the provisions of the Horses Rationing Order, farmers are strongly urged to see that their men do not exceed the rations there laid down. Although the scale there given is below what the men are accustomed to give in peace time, it is quite liberal enough to enable the horses to do their full work and to keep in good condition. When out to grass a considerable reduction in the feed given should be made. Copies of the Order may be obtained from the Controller of Horse Transport, 7, Whitehall Gardens, London, S.W. 1.

Milking Cows.—Experiments carried out at various Agricultural Colleges have shown that where cows are out to pasture, cake is unnecessary until after mid-July, even where the cows are fairly heavy milkers. Dairy farmers, therefore, need have no misgivings in refraining from the use of concentrated feeding stuffs until this period, and they should confine themselves to giving a little cotton cake in cases where the cows when turned out to grass show a tendency to scour.

Calves.—The small quantities of linseed and oats available for feeding live stock have made the question of obtaining satisfactory milk substitutes a difficult one. In view of this it may be of interest to state that the following mixtures have been successfully used in recent calf-rearing experiments,* when used in conjunction with whey. They are :—

1. A mixture of two-thirds by weight of oatmeal or fine thirds and one-third fish meal made into a porridge with boiling water and fed along with the whey.
2. Palm nut meal.

* West of Scotland Agri. Coll. Report, 1916–1917.

The calves were fed on whole milk for the first three weeks, and the whey and meal gradually introduced during the next three weeks, at the end of which period they were getting 1 gal. of whey and ½ lb. of the mixed meals per head per day. From six weeks to three months the average consumption was 1½ gal. of whey and 1 lb. of meal. The calves in addition were allowed to pick over fine hay and were given linseed cake after the eighth week.

Cattle for Beef Production.—No cake is available for bullocks, but on good pastures no difficulty will be met with in getting thriving two-year-olds ready for the butcher without cake.

Older cattle should run on the poorer grass land, ready to finish off next winter on roots and straw.

Yearlings should be kept over the winter on grass with a little hay for grazing in the summer of 1919, as the lack of cake will prevent the possibility of getting any ready for the butcher this year.

Sheep and Pigs.—The feeding of sheep and pigs has been fully discussed in recent numbers of the *Journal.*

Notes on Manures in June:
From the Rothamsted Experimental Station, Harpenden, Herts.

Liquid Manure.—In view of the restricted supplies of nitrogenous manure every possible care should be taken of the liquid manure, especially on dairy farms. Repeated analyses have shown the value of the liquid, and long experience of farmers and direct experiments by investigators alike prove its usefulness as a fertiliser. In cases where the drains from the cow-sheds and stables run into a tank the system should be examined as early as possible so as to put it in order; if there is no tank an effort should be made to provide one. Probably 20 gal. per cow per week is a sufficient allowance for periods when the cows are in the shed all day, and of course a less amount when they are out of doors part of the time.

Salt for Mangolds.—Emphasis should be laid on the fact that salt in many cases increases the yield of mangolds, especially on rather light soils; experiments in the North (Cockle Park), the West (Harper Adams College), the Midlands (Woburn and Kingston) and the South (Rothamsted), have given favourable results. Fortunately, salt is a native product and can be obtained in this country in any desired quantity, though difficulty is sometimes experienced in obtaining delivery by

rail. The dressing to apply is 2 cwt. in the drills, and a further 1 cwt. top-dressing proved effective in the Midland agricultural trials.

Repair of Damage to Cereal Crops Done by Wireworms.—In cases where the plant is still alive but is being damaged by wireworms it may be helped to grow away from the attack by a dressing of quick-acting nitrogenous manure. Where the plant is nearly dead, this course cannot be adopted; some other plan must be tried, such as substitution of linseed, etc.

Bad Patches in Seed Leys May Indicate Lack of Lime.—Bad patches in the seed leys should be carefully examined as they may, and often do, indicate a lack of lime in the soil. Probably nothing can be done now, but the necessary lime, limestone or chalk should be laid in as early as possible so as to be ready for application in the autumn before the leys are ploughed up for the cereal crop. It is important that the utmost value should be got out of the residue of the ley ploughed in for the next year's corn crop, but this can only be done if sufficient lime is present in the soil. If the patches arise from the unsuitableness of the seeds mixture to the general climatic conditions it is desirable to change the formula and use a new mixture. If the crop does not look well after the first cut it should be ploughed up as soon after cutting as possible so as to get a long autumn fallow.

Buy London Stable Manure Early.—Potato growers in the home counties who are accustomed to use London stable manure in large quantities should buy early in view of the uncertainty of delivery, and clamp in the field where it is to be used next year. The clamp should be sheltered as much as possible from rain and sun, and it should be covered with a layer of earth. Summer storage of manure is undesirable as a general rule, but in this case it is probably the least risky course; it offers the advantage that the manure can be put into the land at the first ploughing in autumn, thereby facilitating decomposition of the manure and thus benefiting the crop, and also pushing forward some of the work, thus saving time in the spring.

Ash-pit Refuse.—In some parts of the country there are dumps of ash-pit refuse which may be useful manure. The only way of ascertaining their value is to have analyses made, and the accuracy of these will depend on the care with which the samples are drawn, which is by no means an easy task. If possible the county expert should be asked to arrange for the sampling so as to ensure a reasonable degree of accuracy.

THE following Note was published by the Food Production Department early in May :—

Potatoes *versus* Peas.

It is difficult to lay down a hard and fast rule on the subject of the crops most suitable for growing by small cultivators. Much depends upon the area of ground under cultivation, the difficulty or ease of transport for surplus produce, and the outlet for that surplus in the vicinity of the ground cultivated. Nevertheless, if the grower keeps in mind the broad fact of the situation that there is, and will be, a general scarcity, he can form for himself an intelligent opinion of the crops which it is worth his while to grow. Of these crops the potato stands easily first in the list.

At first sight it might seem that the bean and pulse crops, with their richness in nitrogenous food-proteins, should be increased largely in order to provide the only possible vegetable substitute for meat, and this view would seem to be supported when a comparison is made between the amounts of the essential foods contained in the bean and pulse crop, on the one hand, and the amounts contained in the potato on the other. These quantities are as follows :—

Food.	*Proteins.* Per cent.	*Fats.* Per cent.	*Carbohydrates (Starch, etc.)* Per cent.	*Calories.*
Dry Bean and Pulse Crops averages ..	23·1 ..	2·3 ..	53·6 ..	1,520
Potatoes	1·8 ..	0·1 ..	14·7 ..	310

From this table it might appear that bean and pulse crops, with their high percentage of proteins, would be much more profitable to grow in the present time of meat shortage than the potato, and the same conclusion would appear to be demonstrated by the fact shown in the last column that the food value as measured in food units or calories of a pound of bean and pulse crops is nearly five times as great as that in a pound of potatoes. But to draw such conclusions as these is to leave out of account one essential fact, namely, the relative yields per acre of these crops.

In order to judge the food value of a crop, yield per acre as well as chemical composition must be taken into consideration. We may assume that under garden conditions potatoes will yield 10 tons to the acre. The yield of dry bean or pulse seed cannot be put at more than 1 ton to the acre, and in the case of some of these crops it should be put at considerably less.

Reconstructing our table on the basis of yield per unit of area cultivated, we have the following :—

Food.	*Proteins.* Per cent.	*Fats.* Per cent.	*Carbohydrates (Starch, etc.)* Per cent.	*Calories.*
Dry Bean and Pulse Crops averages ..	23·1	2·3	53·6	1,520
Potatoes	18·0	1·0	147·0	3,100

This table reflects at a glance the fact that the potato crop beats the bean and pulse crops out of the field as a food crop, and that a given piece of ground under potatoes produces just about double the number of food units that are produced by an equal area under bean or pulse crops.

A good general rule to be followed by small cultivators is: Make sure of producing enough potatoes for your own requirements. help to supply any deficiency in the potatoes grown in your district by putting a further piece of ground under this crop, and then in the light of what has already been said use your discretion with respect to the growing of bean and pulse crops.

Position of the Fertiliser Trade After the War.

THE Departmental Committee appointed to consider the post-war position of the sulphuric acid and fertiliser trades as affected by the new acid plants, which have been erected during the War by the Ministry of Munitions for the Government, have just issued their Report, copies of which may be obtained from H.M. Stationery Office, Imperial House, Kingsway, W.C. 2., price 2*d.* net., excluding postage. The Ministry of Munitions, the Board of Agriculture, the Ministry of Food, and certain other Government Departments were represented on the Committee, as well as some of the most important Fertiliser Associations in the country, with Mr. Edward Shortt, K.C., M.P., in the Chair, and Mr. M. P. Applebey as the Secretary.

The Committee in their Report review the sulphuric acid trade before the War, and make recommendations as to the measures which should be taken in regard to the future output. The following are the principal points in the Report of interest to agriculturists :—

The Fertiliser Industries Before the War.—The production of sulphate of ammonia and of phosphatic manures before the

War provided the principal outlets for sulphuric acid, these two industries absorbing about 60 per cent. of the pre-war production.

The principal industrial sources of ammonia in the country are the carbonisation of coal and the distillation of shale. In each of these processes ammonia is an essential and a valuable by-product. In consequence of the progressive introduction of by-product coking the output of ammonia was steadily increasing, and at the outbreak of the War amounted to 400,000 tons per annum expressed as sulphate. About 15 per cent. of this production was not put on the market in the form of sulphate, but was converted into other ammonia products. The home consumption of sulphate of ammonia for agricultural purposes was only 60,000 tons per annum, and the remainder was mainly exported.

For some years before the War the manufacture of superphosphate in this country was in a very unsettled condition owing to the rapidly increasing importation of foreign manufacture and the gradual decline in the export trade. The export of superphosphates had reached a maximum of 160,000 tons in 1911, but had afterwards declined to 63,000 tons in 1913. The cause of this decline is to be sought partly in the erection of superphosphate plant in countries which previously imported this fertiliser. and partly in the competition of continental countries which, with the aid of cheap by-product acid from zinc manufacture, and in some cases with specially favourable freight conditions, succeeded in displacing their less favourably situated British competitors. This country possesses no natural advantages for the manufacture of superphosphates, since both pyrites and phosphate rock have to be imported as raw materials. It is, therefore, natural that when the consumption of superphosphate in countries such as Spain and Portugal reaches a certain point, local manufacture is undertaken, and, with the advantage of proximity to the raw material, soon succeeds in overcoming the competition of imported superphosphate from less favourably situated countries.

As in the case of sulphuric acid, the available plant was capable, if continuously worked, of producing considerably more than the actual requirements of superphosphate. The position with regard to manufacturing efficiency was somewhat varied. Most superphosphate works were associated with acid plants, and the larger producers were equipped with mechanical and labour-saving devices, which enabled them to

produce as economically as the continental works. Some of the smaller works, however, and especially those which had suffered from the loss of the export trade, had not been kept up to date, as the uncertain prospects of the trade led to unwillingness to incur outlay in development of plant.

One advantage which the fertiliser trades enjoyed was the existence of active and energetic trade associations. Both the Sulphate of Ammonia Association and the Fertiliser Manufacturers' Association were able to render valuable assistance to the individual producers, especially by organised propaganda, with a view to the creation and expansion of markets for their products.

The Fertiliser Industries During the War.—The expansion in the production of ammonia has during the War period been somewhat accelerated owing to its association with the by-product coking industry. The production of sulphate of ammonia has, however, suffered a temporary decline, owing to the diversion of large quantities of ammonia to the production of nitrate of ammonia. In view of the requirements of sulphuric acid for explosives manufacture, plants have been erected on a considerable scale for the conversion of crude ammonia into concentrated ammoniacal liquor. A substantial proportion of the requirements of ammonia for munitions purposes has thus been purchased in a form which requires no sulphuric acid for its manufacture. The total production of sulphate has thus been temporarily reduced from 350,000 tons to a little over 250,000 tons.

At the same time, there has been a large increase in the home consumption for agricultural purposes, owing to the substitution of this fertiliser for nitrate of soda, the entire supply of which has been required for explosives manufacture. The Board of Agriculture are understood to be aiming at the application of the entire available supply of sulphate to home purposes. The export trade has accordingly nearly disappeared, the only exports now allowed being relatively small quantities to allied countries and British Possessions.

The production of superphosphate has been very materially reduced during the War owing to the lack of sulphuric acid. From 1915, when the production of explosives on a large scale began, very large calls have been made on the output of the acid plant worked by the superphosphate makers. The production of superphosphate in 1916 fell to about 500,000 tons as compared with about 800,000 tons in 1913. During

the last few months, however, (*i.e.*, before February, 1918), the paramount necessity of increasing the home-grown food supply has been realised, and steps have been taken to secure a large and immediate production of superphosphate. Renèwal and extension of superphosphate plant is accordingly proceeding at the present time with a view to recovering the lost ground as speedily as possible.

German Production of Nitrogen.—The following table shows the German production of nitrogen (calculated as sulphate of ammonia) :—

1913.		*1917 (estimated).*		*Fixed Nitrogen.*
480,000 tons	Sulphate of Ammonia ..	700,000	=	140,000 tons.
30,000 ,,	Cyanamide	400,000	=	80,000 ,,
20,000 ,,	Ammonia Haber ..	500,000	=	100,000 ,,
750,000 ,,	Nitrate of Soda Imports	nil.		—
				320,000 tons.

These processes may ultimately assume similar importance in this country, but as their success is conditional upon the provision of cheap power, and as the processes are as yet undeveloped here, they cannot be so important a factor as to influence to any marked extent the conditions immediately following upon the cessation of hostilities. On the other hand the introduction of synthetic methods for the production of nitric acid. which are now in early stages of operation, tends to diminish the consumption of sulphuric acid for the manufacture of nitric acid.

The Post-War Position.—The Committee are therefore agreed that the immediate increase in the consumption of acid after the War is almost wholly a question of the development of the superphosphate industry. They have accordingly considered evidence both from agricultural experts and from fertiliser manufacturers as to the probable post-war position. Though opinions differ as to the quantity of superphosphate which can be absorbed, the Committee find that the agricultural experts whom they have consulted are unanimous in the view that very considerably increased fertilisation of the soil by means of superphosphate is not only possible but is highly desirable in the national interest. It is evident from the opinion of these witnesses, quite apart from any question of manufacturing facilities. that the greatly extended use of phosphatic manures is both economically profitable and is essential for the efficient cultivation of the land. The extent to which such extended use will in fact take place depends mainly upon the agricultural policy of the Government. Mr. T. H. Middleton, Deputy

Director-General of the Food Production Department, who gave evidence as the representative of the Board of Agriculture, submitted to the Committee an estimate of the post-war increase of fertilisers which he regarded as reasonable on the assumption that 3,600,000 acres of arable land were added to the existing area in the United Kingdom and that a larger proportion of the grass land was manured. This estimate indicated that in Mr. Middleton's opinion an additional quantity of 620,000 tons of superphosphate and 629,000 tons of basic slag could with advantage be used. This increased quantity of superphosphate would correspond to the absorption of 200,000 tons of sulphuric acid.

The available supply of basic slag is not likely to approach the figure mentioned above, but as this phosphatic manure can to a considerable extent be replaced by superphosphate it is evident that a much larger quantity of superphosphate could be employed if it were available.

The question of the future export market for superphosphate is one in which it has been difficult to obtain any exact data. The export trade has declined for reasons already set forth, and fertiliser manufacturers themselves do not appear to anticipate any considerable revival. On the other hand, Dr. E. J. Russell has referred to the probability of an increased demand in Australia, South Africa, and India, and to the likelihood of an increased demand in Russia and Rumania. It is, however, at least uncertain whether British manufacturers would be able to compete in these markets with superphosphates produced on the spot, or in places so situated as to give advantages in transport over the British producer. It would, therefore, be unwise to count upon the export trade as a means of permanently reducing the surplus to any extent, although in the years immediately succeeding the War Belgium may be a large buyer.

Agricultural Policy.—In view of the proved agricultural need for the use of additional quantities of fertilisers the Committee are of opinion that the large surplus of sulphuric acid plant which will become available at the end of the War provides an opportunity of an altogether exceptional nature for the development of a vigorous agricultural policy in relation to the efficient cultivation of the soil. Having regard, therefore, to the guarantees which are given to the farmer under the Corn Production Act, they recommend that the powers provided by Section 9 of the Act should be widely used to enforce the adequate use of fertilisers. Any necessary measures should

at the same time be taken to secure the sale of fertilisers to the farmer at reasonably low prices.

The educational work of the Board of Agriculture in this direction should be continued and extended. The farmer is slow to adopt new methods. On this account the Committee are of opinion that no effort should be spared to bring home to him the importance and the economic and financial advantages of an increased use of fertilisers.

Recommendations.—Among the recommendations of the Committee may be mentioned the following, which should have considerable bearing on the supply of fertilisers after the War :—

(*a*) That arrangements should be made with shipping, railway and canal companies for cheap and adequate transport of raw materials, acid and fertilisers, and that cheap freights should be arranged for the carriage of fertilisers to any part of the Empire or any Allied or neutral country where an opening for a market may offer.

(*b*) That the representative Joint Committee which has been recommended in paragraph 18* should be formed at once, and that it should include representatives of such Government Departments as may be interested ; further, that its functions should be—

(1) To endeavour to secure the introduction of acid made in Government works to the market in such a manner as to produce a minimum of disturbance, having due regard to the interests of all the industries concerned, and

(2) To suggest means whereby the erection of new acid works to deal with the gases from zinc concentrates can be avoided.

Pratical Hints on Potato Spraying.

THE Food Production Department (72, Victoria Street, London, S.W. 1) have made arrangements whereby sufficient sulphate of copper will be available for the spraying of the 1918 potato crop, provided that supplies are ordered forthwith. Last year many orders were placed so late that lack of transit facilities made it impossible to obtain delivery in time, and such difficulties will be intensified this year. Orders for soda crystals should also be placed without delay.

* Not here printed.

Prices of Copper Sulphate.—The prices for copper sulphate are as given in the enclosed statement, which includes the prices charged in April:—

Date for Delivery.	*Price.*	
April, 1918	£50 per ton	f.o.r. at maker's works.
May/August, inclusive, 1918	£52 ,,	

Quantity included in Sale, *ex* Shop or *ex* Store.	Date for Delivery, *ex* Shop or *ex* Store.	
	April	May/August, inclusive.
	s. *d.*	*s.* *d.*
2 cwt. and over	55 0	56 0 per cwt.
56 lb. and over, but less than 2 cwt. ..	57 0	58 0 ,,
28 ,, ,, ,, 56 lb. ..	59 0	60 0 ,,
8 ,, ,, ,, 28 ,, ..	0 7	0 7 per lb.
4 ,, ,, ,, 8 ,,	0 7½	0 8 ,,
1 ,, ,, ,, 4 ,, ..	0 8½	0 9 ,,

Bags of copper sulphate and soda remaining from last year should be *carefully weighed* before use and the *new instructions* for mixing appended hereto rigidly followed. The copper sulphate may be used if it has been kept in a dry place during the winter, but if possible fresh soda should be procured, any surplus from last year being used for domestic purposes (*not* cooking). Copper-sulphate bags should weigh 4 lb., and soda bags 5 lb.

Many growers already have spraying machines, but in view of the probable increase of the area under potatoes this year the existing stock of machines should be increased, and arrangements made by which growers may share the use of a machine. Arrangements have been made for the manufacture of a certain number of knapsack spraying machines, but when these have been disposed of, there is no prospect of any more being obtainable. The importance of ordering early will therefore be realised. The present cash price is 70*s.* but this may be increased shortly.

Prices of Soda Crystals.—The principal manufacturers of soda crystals will supply this product during the season of 1918 at £4 7*s.* 6*d.* net per ton in 2-cwt. bags, delivered to any station in England, Scotland and Wales, in 5-ton lots. In large cities and other approved centres, lots of 1 ton and upwards will be supplied at the same price. For lots of less than 1 ton, orders should be placed with local dealers.

The retail price of soda crystals sold from shop or store ought not to exceed the following :—

	s.	d.
56 lb.	3	6
14 ,, ...	1	0
7 ,, ...	0	6
1 ,, ...	0	1

The demand for soda crystals can only be met by the manufacturers if orders are placed immediately and delivery accepted as and when facilities offer. Horticultural associations, farmers, allotment holders and others should therefore make arrangements to combine their requirements, and to place orders at once with manufacturers or dealers for lots of 1 ton and upwards, and with dealers or retailers for small quantities.

Principal Manufacturers of Knapsack Spraying Machines.—

1. Messrs. Benton & Stone, Bracebridge Street, Birmingham.
*2. Cooper, Pegler & Co., 24, Christopher Street, London, E.C.
3. Four Oaks Spraying Company, Four Oaks, Sutton Coldfield.
4. Messrs. W. T. French & Son, Ladywood, Birmingham.
5. Mackie & Co., Caversham Road, Reading.
6. Parkinson Stove Company, Stechford.
7. I. & W. Purser, Ltd., 15, Charles Street, Hatton Garden, London, E.C.
8. Stonehouse Works Company, West Bromwich.
9. United Brassfounders, Ltd., Holloway Head, Birmingham.

Available horse-power spraying machines should be utilised to the fullest extent.

Many farmers are reluctant to purchase requisites before they are needed, in the hope that prices may reach a lower level. There will be no advantage in waiting as regards spraying-machines and materials, however, for 1918. Delay in ordering now may result in failure to obtain supplies. Both machines and materials may be obtained through the usual trade channels.

There should now be no necessity to impress upon growers the fact that spraying pays. Continued experiments have shown that on an average of a series of years spraying has increased the yield of sound potatoes by approximately 2 tons per statute acre; while in a bad season the neglect of this operation often means the loss of a large proportion of the crop.

* This firm import the Vermorel "Éclair" machines, but although in this case existing specifications cannot be changed, the price will be 70s., less 15 per cent. to wholesale trade.

The Care and Use of Knapsack Spraying Machines.—*Internal Pump Machines.*—Remove spraying nozzle; pump clean water through the hose in order to remove dirt; wash the tank out thoroughly.

Oil the three bearings of the crank shaft; rub the leather shoulder straps with oil to prevent cracking.

External Pump Machines.—Wash out as above; oil all working parts. To secure the smooth working of the pump and prevent the washers from hardening rub them with oil after use; to obtain access to the pump-washers uuscrew the top of the pump-valve.

Unscrew the caps of the two screw-valves at the base of the machine; clean and oil balls at frequent intervals.

For lubricating, use good machine oil; do not use paraffin. If spare parts are needed order them at once.

When filling the machine pour the mixture carefully through the strainer to ensure that no particles of dirt get into the tubes and nozzles.

When the machine is on the back adjusted for use, before the tap is turned on, make several strokes with the pump in order to secure sufficient pressure to throw a very fine mist. Remember that it is necessary to coat both surfaces of the leaves with a fine film of the mixture.

Immediate steps should be taken to procure suitable wooden barrels for mixing purposes, and care must be taken to see that these are thoroughly clean. Tar or paraffin barrels should be carefully cleaned and all traces of tar removed.

Councils, allotment associations and other bodies should arrange for labour to be trained in good time so that the spraying will be carried out efficiently.

In an average season an approximation to the following dates for the first spraying of second early and main crop potatoes will probably be satisfactory.

Cornwall Devon Dorset Isle of Wight and Hampshire Somerset S.W. Wales	June 15th—end of June. N.B.—Spraying should be done the last week of May for early varieties in the Penzance district and the first week of June in other forward districts in Cornwall, Devon, and the Isle of Wight.
Glamorganshire Gloucestershire Monmouthshire N.W. Wales Sussex Wiltshire	July 1st—July 8th.

Berkshire	July 8th—July 15th.
Herefordshire	
Kent	
Oxfordshire	
Surrey	
Worcestershire	
Remainder of the country ..	July 15th—July 31st.

(In the north-eastern counties spraying should usually be deferred until the last week of July.)

The second spraying should generally be done about three weeks after the first. It will serve to cover the new foliage and to protect more completely that already sprayed. In the south-west of England it will often be found advisable to spray a third time, and this applies also to other districts in wet seasons when heavy rains are frequent.

Instructions for Making Burgundy Mixture.—The mixture should be carefully made, otherwise injury to the foliage may result. It is essential that all the soluble copper be precipitated by the addition of sufficient soda. Whilst adding the soda to the solution of copper sulphate the mixture must be vigorously stirred. The precipitate formed by the mingling of these two substances should be flocculent and should remain in suspension for a considerable time.

For Spraying ½ acre (say 50 rods).

1. Dissolve 4 lb. of sulphate of copper in 5 gal. of water in a barrel capable of holding 40 gal., then make up to 35 gal.
   N.B.—Iron or zinc vessels must not be used
2. Dissolve in another vessel in 5 gal. of water 5 lb. of washing soda (previously broken up into small pieces if necessary).
3. When the soda is *completely* dissolved, add (2) to (1), stirring vigorously meanwhile.
   N.B.—Both copper sulphate and soda should be of fully 98 per cent. purity.

Where smaller areas are to be sprayed, barrels, capable of holding 10 gal., may be used; in that case the quantities of copper sulphate and soda given above should each be reduced to ¼, namely, 1 lb. of sulphate of copper and 1¼ lb. of washing soda.

Burgundy mixture should be bright blue in colour and should not settle for a considerable time. Experience has shown that the precipitate remains longer in suspension and adheres better to the foliage when the mixture is made up in the above manner than when the soda is added to a concentrated solution of copper sulphate. The fungicide should be

used in a *fresh state* and in no case should it be applied more than 10 hours after it has been made.

Sulphate of Copper is poisonous, therefore the vessels in which the copper compounds have been prepared should not be used for the preparation of food.

Opinions differ as to the relative value of Bordeaux and Burgundy mixtures; there is, however, no doubt that both are efficient fungicides. Where freshly-burnt stone-lime of good quality is to be obtained the use of Bordeaux mixture is to be recommended; but in districts where good lime is not readily to be had, Burgundy mixture should be used.

Instructions for Making Bordeaux Mixture.—This mixture should be made up in the following proportions:—

Copper sulphate	4 lb.
Quick lime (freshly-burnt lumps)	2 ,,
Water	40 gal.

The copper sulphate should be dissolved in 35 gal. of water in a barrel. The lime should be placed in a separate vessel and slaked *slowly*. This is best done by adding only the amount of water which the lime can absorb. After the lime is thoroughly slaked, more water should be added gradually, stirring all the time, to make up to five gal. It should then be strained through a fine sieve and added to the solution of sulphate of copper, the contents of the barrel being vigorously stirred during the mixing.

Cultivation of Lands—Spraying of Potato Crops to Prevent Disease.—It is hoped that the councils of boroughs and urban and rural districts and parishes will help by purchasing spraying machines, if not already in possession of them, with the necessary chemicals, and hiring them out for use by the smallholders and cottagers in their respective districts, and, where possible, arranging for the spraying to be carried out by a competent operator. The Local Government Board will offer no objection to the incurring of the necessary expenditure, but they consider that a suitable charge should in all cases be made for the use of the machines.

This article is also issued as Food Production Leaflet No. 43, copies of which may be obtained free on application to the Board.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1*d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1; 37, *Peter Street, Manchester; and* 1, *St. Andrew's Crescent, Cardiff.*

THE following Circular, dated 12th April, 1918, has been addressed to County Councils and the Councils of Boroughs and Urban Districts in England and Wales by the Board :—

Regulations Governing the Compulsory Hiring of Land.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to refer to the Board's Circular Letter of the 16th May, 1908 (A. 168/C),* enclosing copies of the Regulations made by the Board as to the compulsory purchase and hiring of land for small holdings and allotments, and to say that the Board have made fresh Regulations governing the compulsory hiring of land.

2. Two copies of the Regulations are enclosed herewith.† Additional copies can be obtained, either directly or through any bookseller, from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 1*d.* each.

3. Apart from the amendments necessary as a result of the passing of the Small Holdings and Allotments Act, 1908, and the Agricultural Holdings Act, 1908, the new Regulations differ from the old by certain amendments in paragraphs 2 (*c*), 5 (1), 6, 19, 20, and the foot-note to the Form of Order for Compulsory Hiring contained in the Appendix, and your attention is particularly directed to these amendments.

4. With regard to the alteration in paragraph 5 (1), namely, the deletion of the last sentence, I am to say that it is not intended by this alteration of the Regulations that Councils should usually insert a date in the notice to treat which leaves a period substantially less than six months, the period originally prescribed, between the date of the service of the notice to treat and the date on which the tenancy of the Council is to commence. The amendment is only intended to meet cases which occur occasionally in which it is not found possible for the Board to confirm the Order in time to allow of such complete period of six months to elapse before the next date of entry consistent with the terms of the Order.

5. In specifying in the notice to treat the date on which the tenancy of the Council shall commence, the Council should bear in mind that before they can take possession the various interests have to be ascertained, and, in default of agreement, the valuation has to be made, and a decision has to be arrived at as to whether the notice to treat shall be withdrawn, and it is desirable that a reasonable notice should be given to the persons interested that possession will be required on the date specified.

6. The amendment of Regulation 20 enables a Council to obtain certain details of the valuation which a valuer has not hitherto been required to furnish, but not to require him to state the basis on which he has arrived at the amounts specified in respect of the several items.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

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* See this *Journal*, June, 1908, p. 223. † Not here printed.

THE following Memorandum (No. 120/M 1), dated 8th April, 1918, has been addressed to Agricultural Executive Committees, Horse Officers and Commissioners by the Food Production Department of the Board :—

Supply of Horse-Drawn Implements.

With reference to the Memorandum No. 106/M 1 of the 21st March, 1918, stating that the Department are in a position to supply horse-drawn implements, the following list shows the types of implements available. A limited number of each type only can be supplied. Applications should be sent in immediately and will be dealt with in the order in which they are received. These implements may be used for hire to farmers as well as for the purposes under F.P. 92. The Department are prepared also to consider the release of these implements for sale to farmers through local agents, who should make application direct to the Department stating precisely their requirements : any financial arrangements will, however, be made between the agent and the manufacturing firm.

Committees who have storage accommodation should make their applications with a view to their future requirements.

ENCLOSURE.

PLOUGHS.

Single-furrow—

G. Brown & Sons, Leighton Buzzard. (General purposes and digger).

J. B. Edlington & Co., Gainsborough. (General purposes.)

G. Gray & Co., Uddingston, N.B. (General purposes.)

D. O. Jones & Co., Carmarthen.

Massey Harris. (Digger.)

Double-furrow—

J. B. Edlington & Co. (General purposes.)

D. O. Jones & Co. (General purposes.)

Massey Harris. (Digger.)

WHIPPLETREES.

(Adaptable 2 and 3-horse.)

CULTIVATORS.

G. Barker & Sons, Perth. (9-tine.)

Martin's. (9-tine.)

A. Newland & Sons, Linlithgow. (9-tine.)

DRILLS.

"Thomas" Double disc drill.

"Monitor" ,, ,,

"Climax" Combined shoe and disc drills.

HARROWS.

Zig-Zag.

ROLLERS.

Cambridge. (Sizes : 6 ft. 6 in. by 20 in., 8 ft. 0 in. by 24 in., 7 ft. 0 in. by 30 in.)

Segment. (Sizes : 6 ft. 6 in. by 20 in., 7 ft. 0 in. by 24 in.)

THE following Notice was issued by the Food Production Department of the Board in April :—

Tractor and Horse-Drawn Implements.

In addition to the 3,500 tractors placed at the disposal of agriculturists during the past year, the Food Production Department has supplied County Committees with over 2,500 cultivators, pressers, and trailer boxes for use with the tractors. Moreover, the Department has consigned to Committees about 14,000 horse-drawn implements, including 4,800 ploughs, 2,800 harrows and drags, 2,300 rollers and pressers, 1,200 drills, 780 disc harrows, 1,400

THE following Notice was issued by the Food Production Department of the Board on 12th April :—

Cruelty to Government Horses.

Whilst recognising to the full the difficulties of the farmer confronted with a shortage of skilled labour on the one hand, and a shortage of feeding stuffs on the other, the authorities are making it clear that they will show no leniency to anyone guilty of negligence or cruelty to stock. The Food Production Department and the County Committees are taking a very strong line on the necessity of due care and proper feeding for the horses loaned to farmers by the Committees. Any suspicious case brought to official notice is immediately inquired into, and where the evidence seems to demand a prosecution this is promptly undertaken. There is no doubt that farmers generally are in complete sympathy with the drastic punishment of anyone misusing the Government horses; they realise that anything which tends to put these horses out of condition must cause injury to the farming community as a whole. The careless or cruel minority of farmers will be interested to learn that a Bedfordshire farmer who was found guilty of starving three horses, the property of the Bedfordshire Agricultural Executive Committee, has been sentenced to serve one month's imprisonment in the second division, to pay a fine of £25, and the costs of the proceedings against him both at Petty Sessions and at Quarter Sessions, to which he had appealed unsuccessfully from the judgment of the Court below.

THE following Memorandum (No. 139/M. 1) was addressed in April to Agricultural Executive Committees by the Food Production Department of the Board :—

Supply of Harvest Carts and Lorries.

The Department have made contracts for the supply of tip-carts and four-wheeled lorries fitted with raves and harvest ladders for use in connection with Prisoner-of-War Centres and gangs under F.P. 92. It is proposed to supply these approximately in the proportion of three carts and lorries to every ten binders supplied. Committees should state as soon as possible the number of carts and lorries they desire to be supplied with, giving separately the number of each. The Department will have available more lorries than carts, and it may not be possible in each case to meet the precise requirements of the Committee; in that event there will be supplied whatever is at hand, although every effort will be made to meet the wishes of the Committee.

THE Food Production Department call attention to the recent statements by the Prime Minister and Mr. *Prothero* on the subject of the tenure of war-time allotments. The

Tenure of Allotments.

position is that in the case of land which has been taken for allotments under the Cultivation of Lands Order, the Government have promised that legislation will be introduced this Session which will render possible the retention of such land under the Defence of the Realm (Acquisition of Land) Act, 1916, at least until the autumn of 1920, *unless it is shown to the satisfaction* of the Board of Agriculture that the land is required at an earlier date for building or other public purpose. If any allotment

holders of such land have to be dispossessed on that account, the Board will compensate them for the loss of their crops.

The Government have also undertaken to consider whether it is possible to give similar security of tenure to allotment holders under private landlords, at least so long as the shortage of food continues, and also whether further facilities should be afforded for the provision of permanent allotments after the War; but in view of the state of public business it may not be possible to deal with these matters this Session.

THE following Notice was issued in May by the Food Production Department of the Board:—

Horticultural Advisory Committee.

Mr. R. E. Prothero, President of the Board of Agriculture, has appointed a Horticultural Advisory Committee to advise the Board of Agriculture and Fisheries on all questions connected with the promotion of market gardening, fruit-growing, and horticulture generally, and in particular with regard to the distribution of produce and the organisation of the trades connected with those industries in the situation created by the War.

The Committee will be constituted as follows:—

Representatives of the Board of Agriculture: Lt.-Col. Sir David Prain, I.M.S., C.M.G., C.I.E. (*Chairman*), Dr. F. Keeble, C.B.E., F.R.S., (*Deputy Chairman*), and Mr. A. G. L. Rogers.

Representatives of the Growers: National Fruit Growers' Federation, Messrs. W. Colthup, G. F. Glenny, W. G. Lobjoit, A. Marshall, L. Oakes, and E. S. Warwick; National Farmers' Union (Kent Branch), Messrs. Bernard Champion and A. J. Raynham; Horticultural Trades Association of Great Britain and Ireland, Messrs. A. G. Jackman and G. W. Leak; British Florists' Federation, Mr. G. Munro; Lea Valley and District Nurserymen and Growers' Association, Mr. Joseph Rochford; Market Gardeners, Nurserymen and Farmers' Association, Mr. A. J. Leeney (Worthing), and Mr. R. R. Robbins (Middlesex).

Representatives of the Distributors: National Federation of Fruit and Potato Trades Association, Messrs. Ernest Glover, A. S. Harper, and Thomas Major; London Fruit, Flower and Vegetable Markets Association, Mr. F. R. Ridley; London and Provincial Fruit Buyers' Association, Mr. James Bradnum; London and Home Counties Retail Fruiterers and Florists Association, Mr. E. L. Vinden; Fruit Preservers Association, Mr. W. R. Deakin;

Together with Fruiterers' Company, Mr. Stanley Machin; Gardeners' Company, Mr. Francis Agar; and Royal Horticultural Society, Rt. Hon. Lord Lambourne, C.V.O., and Sir Harry J. Veitch, F.L.S., V.M.H.

The Joint Secretaries of the Committee are Mr. G. P. Berry and Lieut. R. Wellington, M.C.

THE following Letter (No. 21/H.), dated 26th April, 1918, has been addressed to Horticultural Sub-Committees by the Food Production Department of the Board:—

Demonstrations and Exhibitions in Fruit and Vegetable Canning.

SIR,—I am directed by the Food Production Department to inform you that prior to the formation of your Sub-Committee the Department accepted the generous offer made by the British Commercial Gas Association, on behalf of numerous Gas

Companies throughout the country, which contained the promise of assistance in popularising the various methods of fruit and vegetable preservation by canning demonstrations and exhibitions and by distributing literature.

The Gas Companies are in many cases, prepared to undertake the organisation of demonstrations free of charge, or to place their premises and fittings at the disposal of your Committee for the purpose of displaying exhibits or giving demonstrations.

In several districts these Companies have already undertaken to organise demonstrations, and the Department desires your Committee to avail themselves of these offers of assistance wherever possible. Where the programme arranged for your county mainly covers the rural districts, and does not include demonstrations in large provincial towns where these Companies can render assistance, the Department are prepared, in approved cases, to send you a special Instructor to undertake demonstrations of this type, and if necessary to supply an exhibit of preserved produce in order to make an attractive display.

I am, etc.,

(Signed) G. F. MIDDLETON,

For Controller of Horticulture.

THE following Notice was issued by the Food Production Department of the Board early in May :—

Fruit and Vegetable Preservation.

Persons intending to can or bottle fruit or vegetables this season are reminded by the Food Production Department that they should lose no time in giving their orders for the necessary cans or bottles or they may be disappointed through delay in delivery. Would-be purchasers of the bottles (or glass jars) should place their orders immediately with the nearest retailer, or with the retailer from whom they usually obtain articles of this kind, and not with the Food Production Department. Only in cases in which it is impossible to obtain supplies from retailers should the Department be approached in the matter.

On the other hand, the Food Production Department is receiving orders for the "Home Canner" (price, carriage paid, £6 10s.), and for cans to be used with the same, for the preservation of fruit or vegetables. It is very important indeed that orders for cans should be sent in without loss of time so that makers can ensure delivery before the opening of the conservation season. Cans are supplied in one or five-gross lots, the price per gross being as follows :—

	1-*Gross Lots.*	5-*Gross Lots.*
American 2 lb. Cans	33*s.* per gross	31*s.* per gross.
,, 3 ,,	40*s.* ,,	37*s.* 6*d.* ,,
,, 6 ,,	45*s.* ,, ½ ,, 86*s.* ,, gross	

Order forms and pamphlets, with full instructions as to the use of he canner and cans, may be obtained on application to the Food Production Department, 72, Victoria Street, S.W. 1.

A number of leaflets on food preserving are also being distributed free by the Secretary, Board of Agriculture, 3, St. James's Square, S.W. 1. They include "Fruit Bottling for Small Holders" (Leaflet No. 250), and "Fruit and Vegetable Drying" (Food Production Leaflet No. 9).

During the last week in April 65 demonstrations in fruit-bottling, drying, and canning were given by representatives of the Food Production Department. Over 5½ millions of bottles have been ordered this season through retailers to date.

AN Order (No. 411), dated the 10th April, 1918, made by the Food Controller, contains the following main provision :—

The Potato (Restriction) Order, 1918.

1. (*a*) Except under a licence of the Food Controller no person shall after 15th April, 1918, use or treat any potatoes or any product obtained from potatoes or any article containing potatoes or containing any such product except for the purposes permitted by this Clause.

(*b*) The permitted purposes, in the case of ware potatoes which are fit for human food, are seed or human food, and in all other cases are seed, human and animal food, and the manufacture of articles of human and animal food, but do not include the manufacture of spirits.

(*c*) Nothing in this Clause shall prevent the use or treatment for any purpose of potatoes or products of potatoes or articles containing potatoes or containing any such product which are unfit to be used for any of the permitted purposes.

AN Order (No. 445), dated the 17th April, 1918, has been made by the Food Controller to the effect that :—

The Potatoes (Amendment) Order, 1918.

1. Clause 28 of the Principal Order* is hereby revoked; and the following Clause substituted :—

"28. The highest or maximum prices at which potatoes of the 1917 crop (other than seed potatoes sold as or for seed) may be sold by the grower thereof shall be as follows :—

	£	s.	d.
"(*a*) For potatoes delivered prior to 15th April, 1918	6	10	0
"(*b*) For potatoes delivered between 15th April, 1918, and 14th May, 1918, inclusive ..	7	0	0
"(*c*) For potatoes delivered after 14th May, 1918	7	10	0

"Except that a grower of potatoes may sell quantities of less than 1 cwt. to consumers at a price not exceeding 1*d*. per lb."

2. Clause 37 (*b*) of the Principal Order is hereby revoked, and the following Sub-clause substituted :—

"(*b*) The amount actually paid or payable by the retailer for carriage and porterage to his shop except any amount included under Sub-clause (*a*) of this Clause."

3. The following Clause shall be inserted between Clauses 48 and 49 of the Principal Order :—

"48. (*a*) On every sale of potatoes except to consumers the seller shall after the 30th April, 1918, furnish the buyer with accounts, invoices or receipts giving full particulars of the quantities sold and the prices paid or payable."

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* See this *Journal*, October, 1917, p. 765.

Contracts for 1918 Potato Crop.

THE Food Controller has decided to extend the date for receiving tenders for forward contracts for the 1918 potato crop to the 31st May. These contracts apply to potatoes grown on acreage planted in excess of that planted in 1916, provided that the 1917 acreage is maintained under potatoes. The contract price ranges from £6 to £7 in England and Wales, and from £5 10s. to £6 10s. in Scotland, according to time of delivery. Applications for forms of tender should be made to the Director of Vegetable Supplies (Contracts Section), 94-100, Cromwell Road, London, S.W. 7. (*National Food Journal*, 24th April, 1918.)

Potatoes Sold by Wholesale.

POTATO Traders in England and Wales who desire to sell potatoes by wholesale after 31st May should apply for the renewal of their certificates of registration not to the Ministry of Food, but to the National Federation of Fruit and Potato Trades Associations, Tavistock Hotel, Covent Garden, London, W.C. 2, or to the Manchester Offices of the Federation, 306, Corn Exchange, Manchester, or else to Associations affiliated to the Federation. Scottish dealers should apply to one of the following associations:— Glasgow and West of Scotland Potato Trade Association, 135, Wellington Street, Glasgow; Edinburgh and East of Scotland Potato Trade Association, 34, North Bridge, Edinburgh; or the Perth, Fife and Forfar Potato Trade Association, 41, South Methven Street, Perth Members of the Co-operative Wholesale Society should address their applications to the headquarters of the Society. (*Board of Trade Journal*, 2nd May, 1918.)

Silos.

THE following Circular Letter (No. 29/S1), dated 9th May, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

DEAR SIR,—The Department is convinced of the importance of immediately encouraging the use of silage in the country, and to this end is prepared to assist agriculturists in the manner set out in the enclosed pamphlet.* It is intended that the drawings, which are being sent under separate cover and the enclosed specifications†, should remain at your offices open to inspection by anyone interested. The pamphlets are for distribution, and I trust that you will be able to hand them to landowners or farmers who are likely to make use of the offer of assistance by the Department. If you can dispose of more copies, I shall be pleased to send you as many as required.

Enquirers who are taking a serious interest and contemplate actually building silos, will be furnished with specifications and drawings on application to the Department.

It is anticipated that before the 1919 crops are cut, a very large number of silos will be applied for, and since building operations in war-time are fraught with unusual delays and difficulties, farmers making earliest application will naturally stand the best chance of getting their contract executed in time for next year's harvest.

I shall be pleased to send an officer from our engineering section to confer as to the choice of site and other matters with anyone who

* See p. 149 of this *Journal*. † Not here printed.

is in your opinion seriously proposing to accept the Department's offer. I can, of course, rely upon you not to transmit any request for a personal visit unless there is a reasonable probability that a silo will be built as the result of it. Approximate prices are given in the pamphlet, and unless any enquirer is prepared for the necessary expenditure a visit from an officer of the Department will be a waste both of time and money.

Yours faithfully,
(Signed) LAWRENCE WEAVER,
Controller of Supplies.

THE following Circular Letter (No. 27/S 3), dated 29th April, 1918, has been addressed to local authorities in England and Wales under the Destructive Insects and Pests Acts, 1877 and 1907, by the Food Production Department of the Board :—

Wart Disease of Potatoes Order of 1918: Circular Letter.

SIR,—I am directed to state, for the information of your local authority, that it has been decided to take further steps for the control of Wart Disease of Potatoes, which at present constitutes a serious danger to the potato crop of the country.

With this object in view, a new Order,* a copy of which is enclosed, has been passed, and I am to invite your attention to the following points of special importance.

It will be observed that occupiers of land affected by the Order will no longer be required to procure licences if they wish to plant potatoes, except as indicated in Article 3 (2) of the Order.

Application to Existing " Infected Areas " and " Infected Premises."—The Order revokes all existing Orders relating to Wart Disease as from the 1st June, 1918, but areas which are infected areas for the purposes of the Wart Disease of Potatoes (Infected Areas) Order of 1914, and the district affected by the Wart Disease of Potatoes (Restricted Districts) Order of 1917, No. 1, will become " Infected Areas " under the new Order.

The provisions of the Order will also apply to all lands which at the commencement of the Order are " Infected Premises " for the purposes of the Wart Disease of Potatoes Order of 1914.

New Areas.—The practice of scheduling numerous small areas as " Infected Areas," and of declaring large numbers of gardens, allotments, and other pieces of land to be " Infected Premises " will be replaced, where the disease is common in districts of considerable extent, by the certification of much larger areas as " Infected Areas." At a later date it may even become necessary, in some instances, to include a whole county in an infected area, as in the case of the district specified in the First Schedule to the accompanying Order.

The provisions of the Order will also be applied to premises not included in an " Infected Area," on which outbreaks of Wart Disease occur in future.

Restrictions on Planting (Article 3).—On and after the 1st June next, no potatoes other than approved immune varieties may be planted in any land affected by the Order, and no occupier of such land will require a licence to plant these varieties, but an inspector of the Board may, in exceptional cases, issue licences authorising the planting of first

* See below.

early varieties susceptible to Wart Disease in land to which the Order applies. The exception relating to first early susceptible varieties is made in view of the limited quantity of first early immune varieties available, but it must not be assumed that licences will be granted, except for special varieties. As the stocks of first early immune varieties become larger the issue of such licences will be discontinued.

Restrictions on the Sale of Approved Immune Varieties (*Article* 4).—Seed potatoes of approved immune varieties may not be sold to any person but a dealer in seed potatoes except under the authority of a licence issued by the Board, and it is desirable that growers concerned, before purchasing their supplies, should ascertain whether the seller has received the requisite licence.

It is also important that dealers should bear this provision in mind, as a serious view will be taken of contraventions of the Order in this respect.

The exact procedure to be followed under this Clause will form the subject of a further communication.

Restrictions on the Use of Potatoes Grown in an Infected Area.—Under Article 5 of the Order it is provided that potatoes grown in an "Infected Area" must not be planted in land which is not in an "Infected Area." The Department attach great importance to compliance with this provision, as in the past the spread of Wart Disease has been due, in a considerable degree, to the planting of potatoes from infected land in soil which is free from the disease.

Notification of Disease.—It will be observed that, under Article 7 of the Order, not only the first outbreak of Wart Disease on any land must be notified to the Board or to an inspector, but that every recurrence must also be reported.

Notification of Order.—It is not anticipated that local authorities will be required to appoint additional officers for the purpose of carrying out any part of this Order, but Article 14 provides that the Order, and any certificate issued by the Board declaring an area to be an "Infected Area," shall be published by the local authority in accordance with any directions given by the Board. The Department desire that growers and others concerned shall be made fully acquainted with the provisions of this Order, and any certificate issued under the Order, and information on this subject, with the necessary directions, will be issued to local authorities from time to time.

I am, etc.,

LAWRENCE WEAVER,

Controller of Supplies.

The Wart Disease of Potatoes Order of 1918.

BY an Order (*The Wart Disease of Potatoes Order of 1918*), dated 10th April, 1918, applying to England and Wales, and which comes into operation on 1st June, 1918, the Board of Agriculture and Fisheries order as follows :—

Definition of Infected Area.—2. (1) For the purposes of this Order the expression "Infected Area" means an area which is for the time being certified by the Board of Agriculture and Fisheries (in this Order referred to as "the Board") to be an area infected with Wart Disease for the purposes of this Order.

(2) The area described in the First Schedule to this Order, and also any area which at the commencement of this Order is an infected area for the purposes of the Wart Disease of Potatoes (Infected Areas) Order of 1914, shall, unless and until the Board otherwise certify, be an infected area for

Restriction on Planting Potatoes in an Infected Area.—3. (1) No person shall plant, or cause or permit to be planted, in any land in his occupation or under his charge which is situated in an infected area, any potatoes which are not of an approved immune variety, and no person shall permit any potatoes to remain in land in his occupation or under his charge if the potatoes have been planted in contravention of this Article, and the removal of the potatoes is required by notice served on him by an inspector; provided that a person shall not be liable to conviction for planting potatoes or causing or permitting potatoes to be planted in contravention of this Article if he proves to the satisfaction of the Court that the potatoes were sold to him as potatoes of an approved immune variety by a person authorised by the Board under this Order to sell for planting potatoes of an approved immune variety, and that he did not know that the potatoes were not of an approved immune variety.

(2) The restrictions imposed by this article shall not apply to any planting which is licensed by an Inspector of the Board for the purpose of enabling a first early variety of potatoes to be grown.

(3) An approved immune variety is a variety approved for the time being by the Board as being immune from Wart Disease.

Restriction on Sale of Approved Immune Varieties.—4. (1) No person shall sell or offer for sale for planting, except to a dealer in seed potatoes, any potatoes of an approved immune variety unless he is authorised to do so by a licence granted by the Board, or in contravention of the conditions (if any) imposed by the licence, and no person shall sell as potatoes of an approved immune variety potatoes which are not of an approved immune variety.

(2) Any person who sells or offers for sale for planting (otherwise than to a dealer in seed potatoes) potatoes of an approved immune variety shall if so required by the person to whom the potatoes are sold or offered for sale produce the authority of the Board or a copy thereof for his inspection and permit him to copy the authority or copy.

Restriction on Use of Potatoes Grown in an Infected Area.—5. No person shall knowingly sell or purchase or use for planting in land which is not in an infected area any potatoes which have to his knowledge been grown in an infected area.

Application of Preceding Provisions to Land not in an Infected Area.—6. (1) An inspector may by notice served on an occupier or other person in charge of land not in an infected area on which the inspector is satisfied that Wart Disease exists, or to which in his opinion the disease is likely to spread, apply the preceding provisions of this Order to such land and such provisions shall, while such notice remains in force, apply to such land as if it were an infected area.

(2) The preceding provisions of this Order shall, without service of notice under this article, apply until they are withdrawn by an inspector, to any lands which at the commencement of this Order are "infected premises" for the purposes of the Wart Disease of Potatoes Order of 1914.

Notification of Disease.—7. (1) The occupier or other person in charge of any land on which Wart Disease exists or appears to exist, and any person having in his possession or under his charge potatoes which are affected with Wart Disease, shall forthwith notify the fact by post or otherwise to the Board or to an inspector.

(2) If Wart Disease is found to exist in any subsequent year on land in respect of which notification of disease has been given a further notification of disease shall be so given.

Sale of Diseased Tubers Prohibited.—8. Tubers visibly affected with Wart Disease shall not be sold or offered for sale for any purpose.

Precautions to be Adopted in Case of an Outbreak of Disease.—9. (1) An inspector may at any time and from time to time by notice served on an occupier or other person in charge of land on which the inspector is satisfied that Wart Disease exists require him to adopt such measures for the prevention of the spread of the disease as are authorised by this Article and specified in the notice.

(2) A notice under this Article may require the occupier or other person in charge of the land to adopt one or more of the following measures, that is to say:—

(a) to destroy any part of the crop of potatoes, except the tubers, by fire or such other suitable method as may be specified in the notice;

(*b*) to boil thoroughly all diseased tubers ;
(*c*) to take such other steps as the inspector may consider necessary to prevent the spread of the disease.

(3) Any such notice may appoint the time within which the adoption of any measure thereby prescribed shall be completed.

(4) Nothing in this Article shall prevent the destruction by the owner, by fire or other effective method, of any tubers affected with Wart Disease.

Service of Notices, etc.—10.—(1) For the purpose of this Order a notice shall be deemed to be served on any person if it is delivered to him personally or left for him at his last known place of abode or business, or sent through the post in a letter addressed to him there ; and a notice purporting to be signed by an inspector shall be *prima facie* evidence that it was signed by him as an inspector.

(2) A copy of every notice served under this Order shall be sent to the Board by the inspector by whom the notice is signed.

(3) A notice served under this Order, which applies the provisions as to infected areas to premises which are not in an infected area, shall remain in force until its operation is determined in writing by an inspector of the Board.

Power to Deal with Diseased Potatoes.—11. An inspector may by a notice served on any person having in his possession or under his charge tubers which are affected with Wart Disease, or which are in a pit, bag or other receptacle with tubers so affected, or which the inspector has reason to believe to have been in a pit, bag or other receptacle with tubers so affected or otherwise exposed to infection with Wart Disease, prohibit the removal of the tubers from the premises on which they are when the notice is served, except under such conditions as the inspector may consider necessary to prevent the spread of Wart Disease and prescribe by the notice.

Information to be Given as to Diseased Potatoes.—12. Every person who has or has had in his possession or under his charge any tubers affected with Wart Disease, and every person who as auctioneer, salesman or otherwise has sold or offered for sale any such tubers shall, if so required in writing by the Board or an inspector, give the Board or the inspector, as the case may be, all such information as he possesses as to the persons in whose possession or under whose charge they are or have been : Provided that any information given under this Article shall not be available as evidence against the person giving the same in any prosecution under this Order, except in respect of an alleged failure to comply with this Article.

Powers of Entry.—13. An inspector, upon production if so required of his appointment, may for the purpose of enforcing this Order enter any land and examine any potatoes thereon.

Notification of Order.—14. This Order and any certificate issued by the Board thereunder shall be published by the Local Authority in accordance with any direction given by the Board.

Offences.—15. Every person shall be liable on conviction to a penalty not exceeding £10, who does any act in contravention of this Order, or fails to do any act which, by this Order or any notice served on him under this Order, he is required to do.

Revocation of Order.—17. (1) The Orders described in the Second Schedule hereto are hereby revoked ; provided that such revocation shall not :—

(i.) affect the previous operation of any such Order or anything duly done or suffered under any such Order ; or
(ii.) affect any right, privilege, obligation or liability acquired, accrued, or incurred under any such Order ; or
(iii.) affect any penalty incurred in respect of any offence committed against any such Order ; or
(iv.) affect any investigation, legal proceeding, or remedy in respect of any such right, privilege, obligation, liability or penalty as aforesaid ;

and any such investigation, legal proceeding or remedy may be instituted, continued, or enforced, and any such penalty may be imposed as if this Order had not been made.

(2) Every notice which requires an occupier to adopt measures for prevention of the spread of Wart Disease and which has been served under an Order hereby revoked shall have effect as if it were a notice duly served under this Order.

FIRST SCHEDULE.

Description of Infected Area.—The area comprising the administrative county of Glamorgan, the county boroughs of Cardiff, Swansea, and Merthyr Tydvil, the petty sessional divisions of Amman Valley and Llanelly, in the administrative county of Carmarthen, the petty sessional divisions of Ystradgynlais and Penderyn, in the administrative county of Brecknock, the petty sessional divisions of Bedwellty and Pontypool, and the parish of Risca, in the administrative county of Monmouth.

SECOND SCHEDULE.

ORDERS REVOKED.

Date of Order.	*Title of Order.*
2nd February, 1914 ..	Wart Disease of Potatoes (Infected Areas) Order of 1914.
2nd February, 1914 ..	Wart Disease of Potatoes of 1914.
15th January, 1917 ..	Wart Disease of Potatoes Order of 1917.
24th November, 1917 ..	Wart Disease of Potatoes (Restricted Districts) Order of 1917, No. 1.

All Orders declaring infected areas for the purposes of the Wart Disease of Potatoes (Infected Areas) Order of 1914 are revoked by this Order.

THE following Notice was issued by the Food Production Department of the Board early in May :—

Corn in Grass.

Recently articles have appeared in several papers describing the experiment made by a South of England agriculturist in growing hay and corn together; corn being drilled into unploughed grass land, eaten off, and then allowed to grow again the following summer for reaping as a corn crop, a hay crop being taken from the same land in the same summer. The Food Production Department has been mentioned as being in some way or another associated with the experiment. Inquiry at the office of the Department, however, elicits the fact that nothing is known of the experiment except that it is still in a very early stage and that no results have yet been attained that would warrant the claims put forward. The experience of farmers in all parts of the country has shown that corn crops are injured by the competition of grasses (twitch, bent, etc.) during their growing period. About a year ago an application was made to the Department for a permit to manufacture a machine for this experiment, and the Department, not desiring to stand in the way of any experimental work which did not impose a burden on the national resources, raised no objection to the making of the machine in question. This circumstance, however, does not carry with it any endorsement of the remarkable claims lately put forward.

THE following Notice was issued in April by the Food Production Department of the Board :—

Sugar Beet: Cultivation in Gardens and Allotments.

At the present time, when pig-keeping is so important and feeding stuffs are scarce and dear, small cultivators will be well advised to sow, where possible, a breadth of sugar beet as a source of food for stock, apart from its value as a sweetening agent.

The crop may be sown on a variety of soils. The most suitable are deep, medium loams, while heavy clays should be avoided. Deep cultivation of the soil is in all cases essential.

Ordinary farmyard manure may be applied at the rate of from 10-12 tons per acre, with the addition of 1½ cwt. of sulphate of ammonia (½ oz. per sq. yd., 1 lb. per rod) and from 3-4 cwt. of superphosphate per acre (1-1½ oz. per sq. yd., and 2½-2¾ lb. per rod) before sowing, or the sulphate of ammonia may be halved and one half held over and given as a top dressing after singling.

It is important that only the best strains should be grown; therefore seed should be purchased from reputable firms or obtained from the Secretary, British Sugar Beet Growers' Society, 14, Victoria Street, S.W. 1.

A good tilth is necessary at sowing time, and the seed is usually drilled on the flat, at distances of 16-18 in. between the rows, and 8-10 in. between the plants, or the small grower may adopt the dot system as recommended in the Food Production Leaflet No. 8; and thus a further economy in seed will be effected.

The rate of sowing is about 10-12 lb. per acre (1-1½ oz. per rod), and the best time to sow is the last week in April or first week in May. Constant stirring of the soil by the horse- or hand-hoe, as soon as the rows can be distinguished, tends greatly towards the production of a strong, healthy seedling.

Singling has to be done about 6 weeks after sowing. The crop is first roughly bunched by the hoe, and then singled by hand. Care should be taken in subsequent hoeings to damage the foliage as little as possible, as the crops yielding the largest sugar content are those which bear the best-developed leaf system.

The crop requires a long growing season, and should not be harvested prematurely, as the percentage of sugar increases to a marked extent during the final stages of ripening.

The lifting period extends from the end of September to the middle of November or a little later, according to the season. Ripeness is indicated by the leaves becoming yellowish-green in colour and drooping. About three-quarters of the foliage should have wilted, but the central leaves should still be fresh and green. The crop should be lifted and stored before there is any danger of hard frost, and only the tops removed by twisting.

Under ordinary conditions, a crop of 12 tons per acre may be expected, and there are instances on record where crops up to 18 tons have been obtained with an avergae of 16·5 per cent. of sugar.

For feeding purposes it is estimated that 4 lb. of good sugar beet are equivalent to 8 lb. of mangolds or 1 lb. of cereal meals in mixed rations. The leaves provide a valuable food for stock, and when dug into the ground their manurial value is high, and the effect can usually be seen on the subsequent rotation.

Numerous attempts have been made to utilise the roots for sweetening purposes, and the following recipes for the manufacture of syrup, which have been found satisfactory by private individuals, are appended:—

1. From Mrs. Smith.—Peel and scrape the beet and remove every particle of skin, then cut it in slices about ¼ in. thick. Cover with water for 2 hours, then simmer for 8 hours, or leave the vessel containing it in a hay-box all night—a hay-box is by far the best. Strain and bottle.

The syrup should be of a bright golden colour like golden syrup. In air-tight bottles it will keep a month, otherwise only a few days. Suitable for any kind of sweetening.

After straining the syrup chop the beet and dry it in a cool oven; it can then be used in place of sultanas for cooking. If the pieces become very hard, soak them for 10 minutes in cold water before using; if they remain fairly soft use them as they are. If the pieces are not required to be used as sultanas afterwards, the raw beet can be run through a mincing machine before cooking. This method of preparing the beet for syrup gives a much quicker result.

2. From Mr. Vincent Banks.—Clean and boil the beet until well cooked, then rub the skins off and cut into thin slices, and chop them up very fine. Put 2 pints of water in an enamelled saucepan and bring to the boil, then put 2 lb. of the chopped beet in, and boil with the lid on for three-quarters of an hour. Press the juice through a fine sieve and strain it through a thick cloth. Put the strained juice into a clean saucepan and bring to the boil, then add half a teaspoonful of bi-carbonate of potash. Keep boiling until reduced to one-third, pour into a hot bottle and cork at once.

Net weight of syrup about 6 oz.

For larger quantities simply multiply all the above according to requirements.

THE following Notice was issued in April by the Food Production Department of the Board:—

The Cultivation of Linseed as a Food for Calves.

Stock rearing is at present one of the farmers' many difficulties. Such milk as is not sold direct should be made into cheese and little, if any, is available for calves. The substitutes for milk formerly in use are, for various reasons, unprocurable. This being the case, the President of the Board of Agriculture and Fisheries wishes to urge as many farmers as possible to grow a small area of linseed.

As a food for calves the value of linseed is too well known to need recommendation. It is particularly rich in oil (35 per cent.) and in albuminoids (23 per cent.), and in these ingredients it far surpasses most other home-grown crops. A pound of linseed is for general feeding purposes equal to nearly 2 lb. of oats or 1½ lb. of the best oilcake or cereal food.

In addition to this it is a crop that can be easily cultivated. A fine surface tilth and a light covering are all it needs. It is suited to most parts of the country and to most soils. It can be sown as late as the middle of May or even later. It is practically immune from wireworm, and may, therefore, be taken after old grass or used for filling up a thin corn crop or replacing one that has failed. When it is too late to sow barley, there is still time enough for linseed.

Stocks both of home-grown and plate linseed suitable for seed production are available. Particulars as to price and cultivation may be obtained from the Controller of Supplies, Food Production Department, 72, Victoria Street, London, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board on 12th April :—

Growing Mangold Seed on the Farm.

In view of the possible shortage of mangold seed next year, the Food Production Department suggest that farmers having a surplus of mangolds at the present time should consider the desirability of planting selected bulbs for seed production. Sound, medium-sized, well-shaped bulbs should be selected. The root should not have been touched by the trimming knife at lifting time. The ground should be prepared by deep tillage and liberal manuring, and the "bulbs" planted at least 2 ft. apart ; if planted at a greater distance they suffer from beating by the wind. All roots planted should be sunk in the soil to their full depth, so that the crown shows just above the surface. The seed is usually ready for harvesting in September and may be threshed out by flail on a sheet or on the barn floor. A yield of about 8 lb. per rod (30¼ sq. yd.) may be expected under favourable conditions

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A NOTICE on the cultivation of sunflowers was issued in April by the Food Production Department of the Board.

Sunflower Cultivation: Potash from Ash.

The Food Production Department has directed the attention of owners and occupiers of land not in use for the growing of food crops to the sunflower. the seeds of which are valuable both as a source of oil and for poultry food, and information has already been received by the Department that a considerable area is being planted with this crop.

In view of the importance of securing the largest possible supply of sunflower seeds the Department makes a further appeal to owners of gardens, those in charge of parks and public gardens, nurserymen, and to small cultivators generally to devote any vacant land *unsuitable for food crops* to growing sunflowers.

Information on the best method of cultivation may be obtained free on application to the Food Production Department ; and seed of the American giant strain of sunflower may be obtained at reasonable prices from seedsmen.

Those who undertake to grow sunflowers should bear in mind that the ash obtained from the plants after the seed has been harvested is, owing to its richness in potash, a manure of considerable value at any time and of great value in the present scarcity of potash manures.

The ash obtained from burning the sunflower stems, leaves and heads is rich in potash, and inasmuch as an acre of sunflowers produces from 2,500 to 4,000 lb. of top the total yield of potash is considerable. Wolff found 62 per cent. of potash in the ash ; the American estimates, however, are lower : these allow 3,000 lb. of top and 160 lb. of ashes per acre of crop, which should contain upwards of 50 lb. of potash.

It is important that this valuable source of potash should be fully utilised ; and to that end, after the seed crop has been gathered, the tops of the plants should be collected and burnt, care being taken to choose a dry day. The ash, which by reason of the potash which it contains is very caustic, should be stored in a dry place until required for use as manure for the potato or other root crop in the following year. The ash should be spread a little while before the potato crop is planted at the rate of from ½ to 1 oz. to the sq. yd. At present prices the value of the potash contained in the ash from 1 acre of sunflowers is about 33*s.* 6*d.*

THE following Circular Letter (No. 28/S4), dated 30th April, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Provision of Copper Sulphate and Soda for Potato Spraying.

SIR,—The Department consider it essential that adequate supplies of copper sulphate and soda for potato spraying should be provided for growers in all parts of your county during the coming season. I am, therefore, to request you to be good enough to take the necessary steps to ascertain whether merchants in the county have placed orders with makers for the supply of these materials and are prepared to stock sufficient quantities to meet the increased demands which may be anticipated.

For your information I enclose copies of two Notices* which have been issued giving the prices at which sulphate of copper and soda crystals can be obtained together. A list of firms to whom applications for supplies should be addressed is also enclosed.

It is desirable that distribution should take place through the agency of merchants who have been in the habit of handling agricultural requisites rather than that the Supplies Sub-Committee should undertake distribution themselves. The Committee will, however, render a very important service if they will see that adequate supplies are held by merchants throughout the county.

I am, etc.,
(Signed) LAWRENCE WEAVER,
Controller of Supplies.

ENCLOSURES.

Copper Sulphate for Potato Spraying.

ON 27th April, the attention of potato growers was drawn by the Food Production Department to the importance of placing orders at once for copper sulphate for spraying potato crops. There is evidence of a large demand; and the supply of copper sulphate available is limited.

The maximum price fixed for sales of not less than 1 ton for delivery from May to August by makers, free on rail, is £52 per ton.

The maximum prices in the case of sales for delivery *ex* vendor's store, shop or *ex* warehouse, railway goods' yard or public wharf are :—

2 cwt. and over	56*s*. per cwt.
56 lb. but less than 2 cwt.	58*s*. ,,
28 ,, ,, 56 lb.	60*s*. ,,
8 ,, ,, 28 ,, ...	7*d*. per lb.
4 ,, ,, 8 ,, ...	8*d*. ,,
1 ,, ,, 4 ,, ...	9*d*. ,,

The cost of transport to consumer's premises may be added to these prices, which are net prompt cash for copper sulphate of standard quality, *i.e.*, not less than 98 per cent. purity.

Orders should be placed at once with local agricultural merchants, wholesale chemists or ironmongers; if any difficulty is experienced in obtaining supplies, growers should communicate with the Food Production Department, 72, Victoria Street, S.W. 1.

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* The Notice on prices of soda crystals is not here printed; particulars are given in the article on Potato Spraying on p. 198.

Copper Sulphate and Soda Crystals.

MERCHANTS wishing to obtain supplies should be advised to apply to one of the following firms :—

Copper Sulphate.

The Mond Nickel Co., Ltd...	39, Victoria Street, London, S.W. 1.
James H. Dennis & Co., Ltd.	24, Chapel Street, Liverpool.
McKechnie Brothers, Ltd. ..	Ditton Road, Widnes, Lancs.
Vivian & Sons, Ltd... ..	Bond Court House, Walbrook, London, E.C. 4.
The United Alkali Co., Ltd.	30, James Street, Liverpool.
Spencer Chapman & Messel, Ltd.	36, Mark Lane, London, E.C. 3.

Soda Crystals.

Brunner Mond & Co., Ltd. ..	Silvertown, E.
The United Alkali Co., Ltd.	30, James Street, Liverpool.

THE following Memorandum was issued to the Press by the Press Bureau on 30th April, 1918 :—

Fertiliser Prices Order, 1918: Memorandum.

The Minister of Munitions has made an Order,* dated 30th April, and taking effect as from 1st May, relating to superphosphate, sulphate of ammonia, and ground basic slag. The Order supersedes previous Orders relating to superphosphates of 20th August, 1917, 17th November, 1917, and 28th March, 1918, as regards sales after 1st May for delivery after 31st May, and regulates trade, fixes maximum prices, and equalises the cost of distribution of the fertilisers by rail or water throughout the United Kingdom.

The Order operates independently of the Fertilisers and Feeding Stuffs Act, 1906. The provisions of the Order as regards maximum prices chargeable do not apply to fertilisers sold for export (other than to Channel Isles or Isle of Man), sales of less than 14 lb., sales for delivery prior to 1st June, or sales of sulphate of ammonia for use in the manufacture of munitions or for industrial purposes.

Licences are required for the sale of fertilisers and for their dispatch under certain conditions. Makers, dealers and users must render such returns as are required.

"Superphosphate" means superphosphate of lime, manufactured from mineral phosphates, but does not include basic superphosphate, bone superphosphate, dissolved bones, bone meal, bone compound, guano, or compound manures, and sulphate of ammonia used for manufacture of compound fertilisers is deemed used for fertilising and not industrial purposes.

The scheme for equalising costs of distribution is contained in the Fifth Schedule to the Order, which provides for the opening by every maker or producer of the fertilisers of an account with the Government, wherein the Government is to be debited with the costs of carriage by rail or water incurred by the maker, and credited with a fixed sum of 2*s*. 6*d*. per ton (allowed for in the maximum prices fixed by the Order and meant to cover the estimated average cost of distribution), the difference being borne by the Government.

* Printed below.

Applications for licences relating to sales and consignments of superphosphates, ground basic slag and sulphate of ammonia to be used as fertilisers, and communications relating to the scheme for equalising costs of distribution should be addressed to the Food Production Department, Board of Agriculture and Fisheries, 72, Victoria Street, S.W. 1.

All other applications in reference to the Order and for licences for sale of sulphate of ammonia to be used in manufacture of munitions of war or for industrial purposes, should be addressed to the Director of Acid Supplies, Ministry of Munitions, Explosives Supply Department, Storey's Gate, Westminster, S.W. 1.

Fertiliser Prices Order, 1918.

THE Minister of Munitions considers it necessary to regulate sales and purchases of superphosphate, sulphate of ammonia, and ground basic slag (in particular by fixing maximum prices at which sales may be effected); also to provide for equalising, so far as possible, the cost of distribution of the said fertilisers by rail or water throughout the United Kingdom, and, for this purpose, to prohibit sales of the same by makers or producers for transport by rail or water, except on a delivered basis and at delivered prices, including, in every case, a fixed sum per ton to cover the estimated average cost of distribution, and to be accounted for by the makers or producers to the Minister or any other Government Department nominated by him for the purpose, by whom any costs of distribution by rail or water in excess of such estimate will be borne.

The Minister of Munitions has therefore made the following Order (*The Fertiliser Prices Order*, 1918), dated 30th April, 1918:—

1. This Order shall take effect as on and from the 1st May, 1918.

2. For the purposes of this Order the maximum prices for superphosphate, sulphate of ammonia, and ground basic slag respectively shall (except as hereinafter otherwise expressly provided) be as follows:—

(*a*) In the case of sales of any of the said fertilisers for delivery in railway trucks at purchaser's or consumer's siding or nearest railway station, or free *ex* barge or ship at purchaser's or consumer's wharf or other available wharf approved by the purchaser, or, in the case of shipments to the Channel Islands or the Isle of Man, f.o.b. at port of shipment, or, in the case of shipments of ground basic slag to Ireland, c.i.f. at Irish port, the following prices, namely:—

(i.) In the case of all sales (other than sales, by makers or producers, of smaller quantities than two tons) the respective prices specified in the First, Second and Third Schedules hereto for superphosphate, sulphate of ammonia and ground basic slag, respectively, according to the date on which, under the terms of the contract for sale, delivery is to be made, and to the description and quality of the fertiliser delivered, but with the addition, in the case of sales of ground basic slag for delivery in Ireland (otherwise than c.i.f. Irish port), of all charges incurred in delivering the ground basic slag from the ship in port of arrival in Ireland to place of delivery, any charges for cartage, haulage or warehousing of such ground basic slag or other services to be charged at not exceeding local rates.

(ii.) In the case of sales, by makers or producers, of any of the said fertilisers in smaller quantities than two tons, the same prices as those specified under paragraph (*d*) of this Clause for sales of the same fertiliser in similar quantities *ex* vendor's store or shop or *ex* warehouse.

(*b*) In the case of sales for delivery at maker's or producer's works free into road vehicles provided by the purchaser or consumer for conveyance direct by road to purchaser's or consumer's premises, the following prices, namely :—

(i.) In the case of all sales (other than sales, by makers or producers, of smaller quantities than two tons) the prices specified in sub-paragraph (i.) of paragraph (*a*) above, less 10*s*. per ton.

(ii.) In the case of sales, by makers or producers, of smaller quantities than two tons, the same prices as those specified under paragraph (*d*) of this Clause for sales of the same fertiliser in similar quantities *ex* vendor's store or shop or *ex* warehouse.

(*c*) In the case of sales for delivery direct by road from maker's or producer's works to purchaser's or consumer's premises in road vehicles provided by the maker or producer, the prices specified under paragraph (*b*) above with the addition of the cost of cartage or haulage from the works to the purchaser's or consumer's premises, to be charged at not exceeding local rates.

(*d*) In the case of sales for delivery *ex* vendor's store or shop, or *ex* warehouse (other than maker's or producer's store or warehouse at point of manufacture), the prices specified under sub-paragraph (i.) of paragraph (*a*) above, with the addition of the following amounts, according to the quantity of superphosphate, sulphate of ammonia, or ground basic slag (as the case may be) included in the sale :—

Quantity Sold.			*Additional Price Authorised.*
1 ton and over	..	..	10*s*. per ton.
2 cwt.	but less than	1 ton	1*s*. per cwt.
1 ,,	,,	2 cwt.	2*s*. ,,
28 lb.	,,	1 ,,	3*s*. ,,
14 ,,	,,	28 lb.	4*s*. ,,

and with the addition also (in the case of sales for delivery *ex* vendor's store or shop, where such store or shop is distant more than 2 miles from the nearest railway station or wharf available for the delivery of the fertiliser in railway truck, ship or barge) of the extra cost of carting or hauling the fertiliser by road from such railway station or wharf to such store or shop over the cost of carting the same a distance of 2 miles, such cost to be charged at not exceeding local rates.

(*e*) In the case of sales for delivery *ex* railway goods yard or public wharf, the prices specified under sub-paragraph (i.) of paragraph (*a*) above, with the addition of 2*s*. 6*d*. per ton in the case of sales of one ton or less, but without any addition in the case of sales of more than one ton.

(*f*) In the case of sales for delivery direct by road or barge from vendor's store or shop, or from warehouse, railway goods yard, or public wharf to consumer's premises, the prices authorised under paragraphs (*d*) and (*e*) above for sales of the same fertiliser in similar quantities *ex* such store, shop, warehouse, yard, or wharf, plus the cost of cartage, haulage or barging, to be charged at not exceeding local rates.

The above prices (other than those authorised under paragraphs (*b*) and (*c*)) include, in every case, a sum of 12*s*. 6*d*. per ton to cover the estimated average cost which will be incurred by makers and producers in distributing the said fertilisers by rail or water throughout the United Kingdom (or in the case of ground basic slag throughout England, Scotland, and Wales, and to Irish ports), which sum of 12*s*. 6*d* per ton shall be accounted for in every case by makers and producers receiving the same as hereafter provided.

3. On sales of two tons or upwards by makers or producers to manure mixers, agricultural merchants or dealers, or co-operative companies or societies incorporated or registered under the Industrial and Provident Societies' Act, or any other Act, the maximum prices fixed by Clause 2 of this Order shall be reduced by a discount or allowance to the purchaser of

5*s*. per ton in the case of superphosphate.
10*s*. ,, ,, ,, sulphate of ammonia.
5*s*. ,, ,, ,, ground basic slag

4. The maximum prices fixed by the foregoing provisions of this Order are net cash prices for superphosphate, sulphate of ammonia, and ground basic slag, in maker's or vendor's bags, net weight excluding weight of bags. Where credit is given to the purchaser a reasonable extra charge may be made, provided that the discount allowed for net cash is quoted on the invoice and is such as to bring the net cash price within the maximum authorised. If purchaser's bags or other packages are used, or the purchaser takes delivery in bulk without bags, a reasonable allowance shall be made to the purchaser. Where 1 ton or upwards is sold for delivery in bags containing less than 2 cwt. each, a reasonable extra charge may be made beyond the maximum prices which would otherwise have been authorised.

5. As on and from the date on which this Order takes effect no person shall sell or purchase, or offer to sell or purchase any superphosphate, sulphate of ammonia, or ground basic slag, except for delivery as specified in one or other of the sub-paragraphs of Clause 2 of this Order, and at a price not exceeding that prescribed by this Order and the First, Second, and Third Schedules hereto respectively as the maximum price for such sale, having regard to the description and quantity of the fertiliser sold, quality, packages, and date for and terms of delivery; nor shall any maker or producer of superphosphate, sulphate of ammonia, or ground basic slag, sell any of the said fertilisers for delivery as mentioned in paragraphs (*a*), (*d*), (*e*), or (*f*) of Clause 2 of this Order, without bringing into account and dealing with the sum of 12*s*. 6*d*. per ton (included in the prices authorised by such paragraphs to be charged on such sales) in manner specified in the scheme for equalising costs of distribution of superphosphate, sulphate of ammonia, and ground basic slag, set out in the Fifth Schedule hereto. Provided that:

(*a*) A vendor of superphosphate, sulphate of ammonia, or ground basic slag shall not be liable to conviction for selling at a price in excess of the maximum price prescribed by this Order for such sale, if the invoice given to the purchaser, as required by Clause 6 of this Order, states accurately within the limits of error specified in the Fourth Schedule hereto, the percentage of phosphate rendered soluble in water, ammonia, or total phosphate (as the case may be), contained in the superphosphate, sulphate of ammonia, or ground basic slag sold, and the price charged and stated on such invoice does not exceed the correct maximum price on the basis that the percentage stated in such invoice is correct; and

(*b*) A purchaser of superphosphate, sulphate of ammonia, or ground basic slag shall not be liable to conviction for purchasing at a price exceeding the maximum price, unless the price agreed to be paid by him is to his knowledge in excess of the maximum price authorised for such purchase.

6. As on and from the date on which this Order takes effect no person shall sell any superphosphate, sulphate of ammonia, or ground basic slag, without giving to the purchaser, on or before or as soon as possible after delivery, an invoice stating accurately within the limits of error specified in the Fourth Schedule hereto:—

(*a*) In the case of superphosphate the percentage (calculated in terms of tri-basic phosphate of lime) of phosphate rendered soluble in water, contained in the superphosphate delivered.

(*b*) In the case of sulphate of ammonia the percentage of ammonia (NH_3) by weight contained in the sulphate of ammonia delivered; and

(*c*) In the case of ground basic slag, the percentage (calculated in terms of tri-basic phosphate of lime) of total phosphate contained in the basic slag delivered.

and also, in the case of all three fertilisers, stating the price charged, together with any further particulars required to be stated on such invoice by any of the provisions of this Order or the Schedules hereto.

7. None of the foregoing provisions or restrictions of this Order as regards maximum prices chargeable or otherwise shall apply to—

(*a*) Any sales of superphosphate, sulphate of ammonia, or ground basic slag, for export from the United Kingdom to any country other than the Channel Islands or the Isle of Man.

(*b*) Any sales of any of the said fertilisers in quantities less than 14 lb.

(*c*) Any sales of any of the said fertilisers for delivery prior to the 1st June, 1918.

(*d*) Any sales of sulphate of ammonia for use in the manufacture of munitions of war or other industrial purposes.

8. As on and from the date on which this Order takes effect, the provisions of the scheme for equalising costs of distribution of superphosphate, sulphate of ammonia, and ground basic slag set out in the Fifth Schedule hereto, shall be binding upon all makers or producers of superphosphate, sulphate of ammonia, or ground basic slag, and upon the Minister of Munitions, or any other Government Department to which, by arrangement with the Minister of Munitions, the carrying out of the said scheme may be delegated; and any balances becoming payable by any such makers or producers to the Minister of Munitions, or any other such Government Department as aforesaid, under the provisions of such scheme shall be recoverable as Crown Debts.

9. As on and from the date on which this Order takes effect—

(*a*) No person shall sell (for delivery on or after the 1st June, 1918) any sulphate of ammonia which is to be used in the manufacture of munitions of war or for other industrial purposes, except under a licence issued by or under the authority of the Minister of Munitions, and in accordance with any terms and conditions of such licence as to quantity, price, mode of delivery, or otherwise.

(*b*) No person shall sell any superphosphate or ground basic slag, or any sulphate of ammonia which is to be used for fertilising purposes, for delivery on or after the 1st June, 1918) in railway trucks at purchaser's or consumer's siding or otherwise as mentioned in paragraph (*a*) of Clause 2 of this Order, except under and in accordance with the terms and conditions of a licence issued by or under the authority of the Minister of Munitions, or any other Government Department or body nominated by him for the purpose.

(*c*) No maker or producer of superphosphate, sulphate of ammonia, or ground blasic slag shall, except under and in accordance with the terms and conditions of a licence issued as mentioned in paragraph (*b*) of this Clause, either (i.) sell to any person any superphosphate or ground basic slag, or any sulphate of ammonia which is to be used for fertilising purposes, for delivery (on or after the 1st June, 1918) *ex* railway goods yard or public wharf, or (ii.) sell any of such fertilisers for delivery (on or after that date) as mentioned in paragraphs (*b*) or (*c*) of Clause 2 of this Order to any person other than a consumer purchasing the same for consumption on his own premises.

(*d*) No person shall, except under and in accordance with the terms and conditions of a licence issued as mentioned in paragraph (*b*) of this Clause, consign or despatch any superphosphate or ground basic slag (or any sulphate of ammonia which is to be used for fertilising purposes, by rail (other than light railway) to or for delivery to any person in smaller quantities than 4 tons, otherwise than as part of a consignment of not less than 4 tons of goods made from the same point of departure to same final railway destination at the same time.

10. All persons engaged in producing, manufacturing, selling, distributing, or storing superphosphate, sulphate of ammonia, or ground basic slag, or in any manufacture in which the same or any of them are used, shall make such returns with regard to their businesses, and shall verify the same in such manner (including production of their books to any accredited representative of the Minister of Munitions), as shall from time to time be required by or under the authority of the Minister of Munitions.

11. This Order and the Fertilisers and Feeding Stuffs Act, 1906, shall operate and have effect independently of one another, and nothing contained in this Order shall be held to exempt any person from compliance with any of the provisions or requirements of such Act, or any Regulations made thereunder, applicable to sales or purchases of superphosphate, sulphate of ammonia, or ground basic slag: nor shall any of the provisions of the said Act or Regulations be held to govern or affect any of the requirements or provisions of this Order, or any proceedings instituted in respect of any breach hereof.

12. This Order supersedes the Orders relating to superphosphates, made by the Minister of Munitions on the 20th August, 1917, the 17th November, 1917, and the 28th March, 1918, respectively, so far as regards all sales of superphosphate, for delivery on or after the 1st June, 1918, made on or after the date on which this Order takes effect.

13. For the purposes of this Order "superphosphate" shall mean superphosphate of lime manufactured from mineral phosphate, but shall not include basic superphosphate, bone superphosphate, dissolved bones, bone meal, bone compound, guano, or compound manures; and sulphate of ammonia used for the manufacture of compound fertilisers shall be deemed to be used for fertilising purposes, and not for industrial purposes.

14. This Order may be cited as the Fertiliser Prices Order, 1918.

FIRST SCHEDULE.

Maximum Prices for Superphosphate.

Percentage (calculated in terms of tri-basic phosphate of lime) of phosphate rendered soluble in water.	*Price per ton.* £	s.	d.
15 per cent. and over, but less than 16 per cent. ..	4	12	6
16 " " " 17 " ..	4	15	0
17 " " " 18 " ..	4	17	6
18 " " " 19 " ..	5	0	0
19 " " " 20 " ..	5	2	6
20 " " " 21 " ..	5	5	0
21 " " " 22 " ..	5	7	6
22 " " " 23 " ..	5	10	0
23 " " " 24 " ..	5	12	6
24 " " " 25 " ..	5	15	0
25 " " " 26 " ..	5	17	6
26 " " " 27 " ..	6	0	0
27 " " " 28 " ..	6	2	6
28 " " " 29 " ..	6	5	0
29 " " " 30 " ..	6	7	6
30 " " " 31 " ..	6	10	0
31 " " " 32 " ..	6	14	0
32 " " " 33 " ..	6	18	0
33 " " " 34 " ..	7	2	0
34 " " " 35 " ..	7	6	0
35 " " " 36 " ..	7	10	0
36 " " " 37 " ..	7	14	0
37 " " " 38 " ..	7	18	0
38 " " " 39 " ..	8	2	0
39 " " " 40 " ..	8	6	0
40 " " " 41 " ..	8	10	0
41 " " " 42 " ..	8	14	0
42 " " " 43 " ..	8	18	0
43 " " " 44 " ..	9	2	0
44 " " " 45 " ..	9	6	0

The above prices for all qualities are the maximum prices for sales of superphosphate for delivery during December, 1918. The maximum prices

for sales of superphosphate for delivery during June, 1918, will be those fixed by the Superphosphate Order of the 20th August, 1917,* namely 5s. per ton more than the prices set out above, whilst in the case of sales of superphosphate for delivery during other months, the maximum prices for all qualities will be 1s. 6d. per ton per month less or more than the prices set out above, according as the month for delivery precedes or is subsequent to December, 1918, but with a maximum decrease or increase of 7s. 6d. per ton, e.g., the prices for July, 1918, deliveries will be 7s. 6d. less per ton, while the price for May, 1919, deliveries will be 7s. 6d. more per ton than the prices set out above.

SECOND SCHEDULE.

Maximum Prices for Sulphate of Ammonia containing 24½ per cent. by weight of Ammonia (NH_3).

Date of Delivery.	*Price per ton.* £	s.	d.
1st June to 31st August, 1918, inclusive	15	5	0
1st September to 30th November, 1918, inclusive ..	15	15	0
1st December, 1918, to 28th February, 1919, inclusive	16	5	0
1st March to 31st May, 1919, inclusive	16	15	0

For sulphate of ammonia containing more than 24½ per cent. by weight of ammonia, the above maximum prices shall be increased by 3s. 3d. per ton for each complete one-fourth of 1 per cent. (calculated on the total weight of the sulphate of ammonia) by which the ammonia contents are more than 24½ per cent., whilst for sulphate of ammonia containing less than 24½ per cent. by weight of ammonia the above maximum prices shall be reduced by 3s. 3d. per ton for each one-fourth of 1 per cent., or fraction of one-fourth of 1 per cent. (calculated as aforesaid), by which the ammonia contents are less than 24½ per cent.

For sulphate of ammonia containing less than 0·025 per cent. of free acid an additional charge at the rate of 5s. per ton may be made by the vendor, provided that the invoice given by the vendor to the purchaser states such additional charge separately, and contains a guarantee by the vendor that the free acid contained in the sulphate does not exceed 0·025 per cent.

For sulphate of ammonia which is specially ground or pulverised at the request of the purchaser an extra charge (not exceeding 5s. per ton) may be made for special grinding, provided that such extra charge is separately stated on the invoice given to the purchaser as aforesaid.

The above increases or reductions in the maximum prices chargeable shall not apply to any sale of less than 2 cwt. of sulphate of ammonia.

THIRD SCHEDULE.

Maximum Prices for Ground Basic Slag.

Percentage (calculated in terms of tri-basic phosphate of lime) of total phosphate.

	Price per ton. £	s.	d.
12 per cent. and over, but less than 14 per cent. ..	3	0	0
14 ,, ,, ,, 16 ,, ..	3	2	0
16 ,, ,, ,, 18 ,, ..	3	4	0
18 ,, ,, ,, 20 ,, ..	3	6	0
20 ,, ,, ,, 22 ,, ..	3	8	0
22 ,, ,, ,, 24 ,, ..	3	10	0
24 ,, ,, ,, 26 ,, ..	3	13	0
26 ,, ,, ,, 28 ,, ..	3	16	0
28 ,, ,, ,, 30 ,, ..	3	19	0
30 ,, ,, ,, 32 ,, ..	4	2	0
32 ,, ,, ,, 34 ,, ..	4	5	0
34 ,, ,, ,, 36 ,, ..	4	8	0
36 ,, ,, ,, 38 ,, ..	4	11	0
38 ,, ,, ,, 40 ,, ..	4	14	0
40 ,, ,, ,, 42 ,, ..	4	17	0
42 ,, ,, ,, 44 ,, ..	5	0	0

The above prices for all qualities are the maximum prices for sales of ground basic slag for delivery between September 1st, 1918, and 28th February, 1919.

In the case of sales of ground basic slag for delivery during other periods, the maximum prices for all qualities will be less than the prices set out above, in accordance with the following table, namely :—

Period for Delivery.	*Reduction in the Maximum Prices set out above.*
During June, 1918	4*s*. per ton.
,, July, 1918	3*s*. ,,
,, August, 1918	2*s*. ,,
From 1st September, 1918, to 28th February, 1919	Nil.
During March, 1919	2*s*. per ton.
,, April, 1919	3*s*. ,,
,, May, 1919	4*s*. ,,

The above prices for all qualities are for basic slag ground in such a way that at least 80 per cent. of the total weight will pass through a sieve containing 10,000 apertures to the square inch. Where basic slag is sold less finely ground, an allowance off the above maximum prices shall be made to the purchaser at the rate of 3*d*. for each 1 per cent. (calculated on the total weight of the basic slag) by which the quantity which will pass through such sieve as aforesaid is less than 80 per cent., but with an additional allowance at the rate of 9*d*. for each 1 per cent. (calculated as aforesaid) by which the quantity which will pass through such sieve is less than 75 per cent. The invoice to be given to purchasers as required by Clause 6 (*c*) of the above Order shall state in every case the percentage of the total weight of basic slag delivered which will pass through a sieve containing 10,000 apertures to the square inch.

For ground basic slag packed in special bags for carriage by sea an extra charge at the rate of 2*s*. 6*d*. per ton may be made.

FOURTH SCHEDULE.

Limits of Error referred to in Clauses 5 and 6 of the above Order.

Fertiliser.	*Contents, of which Percentage is to be stated on Invoice.*	*Limit of Error (calculated on the Total Weight of the Fertiliser).*
Superphosphate ..	Phosphate rendered soluble in water (calculated in terms of tri-basic phosphate of lime).	1 per cent.
Sulphate of ammonia ..	Ammonia (NH_3)	·25 per cent.
Ground basic slag ..	Total phosphate (calculated in terms of tri-basic phosphate of lime).	2 ,,

FIFTH SCHEDULE.

Scheme for Equalising Costs of Distribution of Superphosphate, Sulphate of Ammonia and Ground Basic Slag.

1. Each maker or producer of superphosphate, sulphate of ammonia or ground basic slag (hereinafter called "the maker") shall open with the Minister of Munitions or any other Government Department nominated by him for this purpose (hereinafter called "the Government") an account entitled "Delivery Charges on Fertilisers."

2. The Government shall be debited in such account with the costs of carriage incurred by the maker in delivering superphosphate, sulphate of ammonia or ground basic slag of his own manufacture sold by him at any time on or after the date on which the above Order takes effect for delivery between the 1st June, 1918, and the 31st May, 1919 (or such other date as may hereafter be fixed by the Minister), and actually delivered between those dates. Provided that except as otherwise expressly authorised by or under the authority of the Government from time to time, either generally or in the case of any particular sale on delivery by the maker :—

(*a*) The costs of carriage to be debited to the Government in the said account shall be the actual costs incurred by the maker, after deducting all rebates, discounts and allowances whatsoever.

(*b*) Nothing shall be debited to the Government in the said account in respect of costs of carriage on (i.) sales for delivery as mentioned in paragraphs

(*b*) and (*c*) of Clause 2 of the above Order, or (ii.) sales of any of the four classes specified in Clause 7 of the above Order.

(*c*) Only costs of carriage by rail or water shall be debited to the Government in the said account, and nothing shall be debited in respect of costs of loading or of cartage, whether from maker's works to railway station or wharf for putting on rail, barge, or ship, or at any other point of transit, except as otherwise expressly below mentioned.

(*d*) The costs which may be debited to the Government shall include :—

(i.) Demurrage incurred on railway wagons and vessels, if due to causes not within the control of the maker or the consignee ;

(ii.) In the case of carriage by water, insurance and shipping charges actually incurred, and also dock dues, if any ;

(iii.) In the case of transport partly by rail and partly by water, for which a through rate is not obtainable, any costs of cartage from rail to ship, or from ship to rail, and of putting on board or on rail at point of transfer ;

(iv.) In the case of sales for export to the Channel Islands or the Isle of Man, the costs of putting on board at port of shipment.

(*e*) The cheapest available route by rail or water must be adopted for all consignments, and in default the maker may not debit the Government with any extra costs of carriage incurred.

(*f*) No sales shall be made by the maker for delivery by rail or water in contravention of any general or special instructions or directions which may from time to time be given by or under the authority of the Government, or of any of the terms or conditions of the licence under which the same is made, and should any such sales be made, no costs of carriage incurred in delivering the fertiliser may be debited to the Government in the said account.

(*g*) In cases where superphosphate, sulphate of ammonia, or ground basic slag is consigned by the maker to his own local store for subsequent delivery or distribution :—

(i.) The cost of carriage by rail or water between the works and the store may be debited to the Government, such debit to be made when the fertiliser has been sold and delivered.

(ii.) Where such store has been approved by the Government for the supply by such maker of superphosphate, sulphate of ammonia and ground basic slag, or any one or more of such fertilisers, to any particular district (but not otherwise), any further costs of carriage by rail or water incurred by the maker in delivering superphosphate, sulphate of ammonia, and/or ground basic slag (as the case may be) from such store to purchasers or consumers within such district, may be debited to the Government ; and in addition, where the fertiliser is delivered into such store on or before the 31st December, 1918, the Government may also be debited with a further sum of 5*s*. per ton (in the case of superphosphate and sulphate of ammonia) and 2*s*. per ton (in the case of ground basic slag) to cover the cost of putting the fertiliser into and out of store, and

(iii.) Where such store has been specially approved by the Government for this purpose (either generally or as regards one or two only of the said three fertilisers) there may also be debited to the Government any costs (not chargeable to the purchaser under paragraphs (*d*) and (*f*) of Clause 2 of the above Order) of cartage or haulage of the superphosphate, sulphate of ammonia, and/or basic slag (as the case may be) into such store from the nearest or other approved railway station or wharf, provided that the same is delivered into such store on or before the 31st December, 1918.

(*h*) In the case of sales of ground basic slag for delivery in Ireland, nothing may be debited to the Government in the said account in respect of any costs of transport from port of arrival in Ireland to place of delivery.

3. The Government shall be credited in the said account with the sum of 12*s*. 6*d*. in respect of each ton of superphosphate, sulphate of ammonia, or basic slag, of the maker's manufacture, sold by him, on or at any time after the date on which the above Order takes effect, for delivery as mentioned in paragraphs (*a*), (*d*), (*e*) or (*f*) of Clause 2 of the above Order between the 1st June, 1918, and the 31st May, 1919 (or such other date as may hereafter be fixed by the Minister), and actually delivered between those dates, such credit to be made from time to time as and when the fertiliser is delivered. Provided that nothing shall be credited to the Government in respect of sales of any of the four classes specified in Clause 7 of the above Order.

4. The said account shall be balanced as on the 31st July, 1918, and the last day of each second calendar month thereafter, ending with the 31st May, 1919, or such other date as aforesaid ; and any balance shown by any such two-monthly account to be due, either from the Government to the maker or from the maker to the Government, shall be paid within twenty-eight days after the same is ascertained, or otherwise as may be arranged.

5. The maker shall render to the Government an account for each two-monthly period aforesaid, in such form and containing such particulars as the Government may require, and shall produce to the Government's representatives, and, if so required, forward to them, together with each two-monthly account, the proper vouchers or certificates for all charges debited to the Government in such account. The maker shall keep (so far as practicable in separate books) true and accurate accounts and records of all costs of carriage incurred and paid by the maker in delivering superphosphate, sulphate of ammonia or basic slag, and shall, whenever required, submit his books and all relevant documents for examination by the Government's representatives.

NOTICE.—By arrangement with the Board of Agriculture and Fisheries, the Board of Agriculture for Scotland, and the Department of Agriculture and Technical Instruction for Ireland, the Minister of Munitions has (until further notice) delegated to those Departments, jointly, the carrying out of the scheme for equalising costs of distribution of superphosphate, sulphate of ammonia, and ground basic slag, set out in the Fifth Schedule to the above Order, and has nominated those Departments, jointly, as the Government Department which is to exercise all powers, authorities and discretions reserved to the Minister by the said Schedule, and with which the accounts referred to in the said Schedule are to be opened and kept, and also as the Government Department, by or under the authority of which licences under paragraphs (*b*), (*c*), or (*d*) of Clause 9 of the above Order (relating to sales and consignments of superphosphate and ground basic slag, and of sulphate of ammonia to be used for fertilising purposes) are to be issued. All communications and applications in connection with the said scheme for equalising costs of distribution (including applications for licences under Clause 9, paragraphs (*b*), (*c*), and (*d*) of the above Order) should, until further notice from those Departments, be addressed to Food Production Department, Board of Agriculture and Fisheries, 72, Victoria Street, S.W. 1.

All other applications in reference to the above Order (including applications for licences under Clause 9 (*a*)) should be addressed to the Director of Acid Supplies, Ministry of Munitions of War, Explosives Supply Department, Storey's Gate, Westminster, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board in April :—

Warning as to Flue Dust.

Farmers are warned against confusing boiler flue dusts and destructor dusts with blast-furnace flue dust. The former are in the main worthless as manures, and contain only about 0·5 per cent. of nitrogen and less than 1 per cent. of potash. Blast-furnace flue dust is a special material obtained from the flues of certain blast-furnaces and may contain from about 3 to 13 per cent. of potash. It is procurable from the agents approved by the Food Production Department for the sale of fertilisers, and a list of such approved agents may be obtained on application to the Food Production Department, 72, Victoria Street, London, S.W. 1.

THE following Letter (No. 21/S1), dated the 2nd April, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Army Stable Manure.

DEAR SIR,—This Department has been in communication with the War Office with regard to the supply of army stable manure to allotment holders and farmers, and an Order of the Army Council was issued on the 10th ultimo drawing the attention of Officers in Command of Remount Camps to the great importance of the maximum effort being put forward, particularly during the next few weeks, to dispose of manure, utilising all the available transport which can be set apart for the work.

In drawing your attention to this Order I am to say that it is most desirable that your Committee should inform themselves as to the distribution of manure at Remount Depots in your county, and that they should draw the attention of allotment holders and agriculturists in the neighbourhood of such Depots to the available supply, with a view to seeing that as much as possible is taken away with all possible speed. It should, of course, be borne in mind that the need of transport for Army purposes must come first, and consequently allotment holders and farmers have no right to expect that manure shall be conveyed to their allotments or farms. Consumers must as far as possible supply their own transport.

In most instances a considerable supply of manure is being disposed of by the Military Authorities in the manner desired, but it may be that in some camps no definite demand on the part of growers has arisen.

In this connection I am to point out that by the Army Order allotment holders and kindred societies may be given preferential treatment to the extent that, after the first ton (which may be given free), only 6*d*. per ton need be charged at the dump (exclusive of delivery).

This Department will be glad to receive a report from your Committee at an early date upon the position with regard to such Remount Camps as may be situated in your county.

Yours faithfully,
(Signed) LAWRENCE WEAVER,
Director of Supplies.

AN Order (No. 372), dated 27th March, 1918, has been made by the Food Controller containing the following main provision :—

The Meat Retail Prices (England and Wales) Order No. 2, 1918.

No person shall directly or indirectly sell or offer or expose for sale or buy or offer to buy in England or Wales any meat by retail at prices exceeding the maximum prices provide by or in pursuance of this Order.

The uniform scale of maximum retail prices for meat set out in the First and Second Schedules to this Order are not here printed. Copies of the Order may be obtained from H.M. Stationery Office, price 1*d*. net, including

AN Order (No. 410), dated 10th April, 1918, has been made by the Food Controller to the effect that :—

The Horses (Rationing) Order, 1918.

1. *General Prohibition Against Feeding Cereal Foodstuffs to Horses.*—No person shall feed any horse or permit any horse to be fed with cereal foodstuffs except as provided in this Order, or under the authority of the Food Controller.

2. *Horses Excluded from the Operation of this Order.*—This Order shall not apply to horses falling within the classes mentioned in the First Schedule.

3. *Limited Rations to Certain Horses.*—(*a*) Horses falling within the classes mentioned in the Second and Third Schedules may not on any day be fed with more than the quantity of cereal foodstuffs prescribed for such horses.

(*b*) The maximum quantity of cereal foodstuffs which may be fed on any one day is prescribed in the Schedules in terms of oats, but maize, beans, peas, or bran may be used in lieu of oats, and if so used they shall be deemed for the purpose of this Order to be the equivalent of oats in the following proportions :—

7½ lb.	Maize	10 lb. oats.
9 ,,	Beans	10 ,,
9 ,,	Peas	10 ,,
12 ,,	Dried brewer's grains	10 ,,
13 ,,	Bran	10 ,,

No other cereal foodstuffs may be used.

4. *Prohibition as Regards Certain Horses.*—Horses falling within the classes mentioned in the Fourth Schedule may not be fed with any cereal foodstuffs.

5. *Hay, Straw, etc.*—No restriction is placed by this Order on the use of hay, straw or roots for the feeding of any horse.

6. *Records.*—Any person or persons in possession of a horse or horses falling within the classes mentioned in the Second and Third Schedules shall keep records of the number and classes of horses kept, in sufficient detail to show (1) the total maximum rations authorised by this Order, (2) the description and quantities of the foodstuffs fed to such horses per week, and (3) the description and quantities of all cereal foodstuffs purchased ; and such records shall at all reasonable times be open to the inspection of an officer of police or any person authorised by the Food Controller.

7. *Interpretation.*—For the purpose of this Order : " Horse " shall include mare, gelding, colt, filly, pony and mule. " Cereal foodstuffs " shall include all grains and beans and peas and products thereof.

Note.—This Order came into force on the 15th April, 1918, and revokes the Horses (Rationing) Order, No. 2, 1917.*

SCHEDULE I.

Horses excluded from the operation of this Order :—

(*a*) Horses in the possession of the Army Council or the Admiralty, or exclusively used for the purposes of the Army Council or the Admiralty.

SCHEDULE II.

Horses solely or mainly used for trade or business purposes to be rationed :—

Class of Horse.	Maximum Daily Ration in Terms of Oats.	
	When in Hard and Continuous Work.	When not in Hard and Continuous Work.
(*a*) Heavy dray and cart horses, and trotting vanners.	14 lb.	10 lb.
(*b*) Light draught horses, and light trotting vanners.	12 ,,	8 ,,
(*c*) Other light horses and cobs ..	9 ,,	6 ,,
(*d*) Ponies 14 hands and under ..	5 ,,	3 ,,

NOTE.—(1) *The jobbing out of horses is not in itself a trade or business purpose within the meaning of this Order.*

(2) *Pit horses and ponies working in the pits or at the pit mouth may be given 4 lb. extra per day.*

(3) *Horses regularly engaged in work at a slow pace not involving heavy loads and allowing of frequent intervals of standing should be regarded as not in hard and continuous work.*

SCHEDULE III.

Horses not used for trade or business purposes to be rationed :—

Class of Horse.	*Maximum Daily Ration in Terms of Oats.*
(*a*) Brood mares	7 lb.
(*b*) Weaned foals	6 ,,
(*c*) Yearlings—	
1st January to 31st May	6 ,,
1st June to 31st August	3 ,,
1st September to 31st December..	6 ,,
(*d*) Racehorses registered with the Controller of Horse Transport, 7, Whitehall Gardens, S.W. 1., for the purposes of the limited racing scheme	13 ,,

SCHEDULE IV.

Horses not to receive any cereal foodstuffs :—

Horses not falling within any of the classes mentioned in Schedules I., II., and III., including :—

(*a*) Racehorses other than those specified in Schedule III.

(*b*) Carriage horses, hunters, hacks, char-a-banc horses, polo ponies, including all horses let out on hire for these purposes, and horses used in entertainments.

(*c*) Horses mainly used for other than business or trade purposes, including all horses let out on hire for other than these purposes.

NOTE.—Correspondence with respect to this Order should be addressed to the Controller of Horse Transport, 7, Whitehall Gardens, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board early in May :—

Growing Maize for Fodder.

In the southern and south-eastern counties where, comparatively speaking, the climate is mild, the rainfall low, and periods of drought are frequent, no forage crop will better repay attention at the present time than maize. It does well in some parts of Cheshire ; but, as a rule, it is not to be depended upon north of the English Midlands. Easily cultivated it is suited to a variety of soils, and will produce a large bulk—20 tons and upwards per acre—of succulent material suitable for supplementary grass in early autumn, or, if made into silage, for replacing part of the winter root-ration. Resembling grass in general composition and feeding properties, maize is much relished by all classes of farm stock ; and it is especially valuable for dairy cows, encouraging a large flow of milk.

Seed at the rate of about 2 bush. per acre may be sown from the middle of May to the middle of June. The Supplies Division of the Food Production Department has made arrangements with the Royal Commission on Wheat for the disposal of a quantity of No. 2 Flat White South African Maize for sowing this season. The maize is being placed on sale through selected agents and the preliminary announcement has already brought in a brisk demand. Farmers interested should apply at once to the Food Production Department, 72, Victoria Street, S.W. 1, from whom full particulars can be obtained as to the nearest source of supply, the price, method of cultivation, etc.

FOOD both for man and beast is being derived from unexpected sources since war compelled us to take stock of our possible reserves.

Fodder Substitutes: Investigation of Unused Resources.

Useful food for poultry and pigs is being successfully prepared from household and slaughter-house waste ; but so far as the feeding of cattle and sheep is concerned, there has been little change in pre-war methods except a compulsory reversion to a more extensive use of roots and other farm crops to make up for the deficiency in cake and grain. There are three or four materials obtainable in considerable quantities at present going to waste which might possibly yield suitable food for different kinds of stock. A correspondent of the Ministry of Food draws attention to the fact that among the unused resources into which investigation is desirable are seaweed and the rhizomes and fronds of bracken.

Information with regard to the properties of these materials as feeding stuffs is still incomplete, although there are records of all their use as stock-food, and even as human food. It is, therefore, possible that experience may bring to light certain objections to the use of these substances which are not immediately apparent.

Value of Bracken.—In the utilisation of bracken as food there are two separate propositions which require to be considered : (1) the young fronds, (2) the rhizomes below ground which are at their best during winter and early spring. The fronds in their young and tender state have been used as food for stock, and even when they are fully grown in late summer and autumn have been given to cattle. But the evidence is that if cattle eat them at that stage in quantities and over considerable

periods outbreaks of poisoning occur. The poisonous properties only appear to develop in the later period of growth.*

Analysis shows that the rhizome is free from deleterious constituents, and expert opinion is that weight for weight it should be about half way in food value between mangolds and potatoes. If this estimate is correct, bracken rhizomes, which on fully-stocked land may amount to 12–16 tons per acre, should form a valuable addition, ground into meal, to winter fodder supplies. Further, the value of the rhizomes forms an incentive for the clearance of land which might otherwise continue to be waste, though our correspondent goes so far as to suggest that it may be more profitable to harvest the bracken regularly than to put the land under grass. It is important that experiments into the utility of the rhizomes as a feeding stuff should be made at once, as in another month they will have passed much of their reserve of food into the young fronds.

Dried Seaweed.—Seaweed has been fed to stock for generations in the crofting districts of the West Coast and the Islands, and in some places the cattle and sheep come down on the beach at low tide to feed on the seaweed. Dried and powdered seaweed fodder has been tried on a limited scale commercially, and although seaweed is not rich in nitrogenous content, and contains too high a proportion of alkali salts to be suitable for feeding alone, the industry appears to have a considerable future before it. In France, experiments have been made in removing a portion of the soluble ash for potash, and the resulting fodder has been fed to cavalry horses. If the French experiments prove successful and it is found possible to obtain two separate products from the seaweed, potash and fodder, there may be considerable commercial possibilities in the preparation of seaweed. By the present process of obtaining kelp only the potash is secured.

In the first instance, attention should be paid especially to those varieties which the cattle are found to select for themselves, and then to other varieties. At the present moment farmers who have been in the habit of using seaweed would render great service by communicating the results of their experience to the Agricultural Adviser of the Ministry of Food. The Germans are making extensive use of heather as fodder, and are said to be importing largely for that purpose. There, again, there is need for experiment and the pooling of experience. (*National Food Journal*, 24th April, 1918.)

The Milk Supply: Its Conservation and Profitable Utilisation.

THE proper use of the abundant supply of milk in spring and early summer is a matter of primary importance under war conditions. Conditions are much more favourable in this country than in other parts of Europe. Nearly everywhere it has been found necessary to ration milk; and the Central Powers have, in many districts, found it impossible to meet even the priority claims of infants, invalids, nursing mothers, and children under six. Only skim milk is available for the general population, and that only in the smallest quantities. Sweden, and even

* See, however, this *Journal* for March last, p. 1446, where a Note on Bracken Poisoning appeared.

Switzerland, deprived of feeding stuffs by the blockade, have been compelled to institute a drastic control of milk supplies. Even in this country we cannot be assured against a possible shortage of milk, milk substitutes, and dairy produce in general next winter. It is, therefore, essential that producers should consider the most profitable use, from the national point of view, of available surplus milk. The first consideration is to secure an adequate and continuous supply, if possible, of fresh whole milk for those members of the community to whom milk is a vital necessity, *i.e.*, infants, young children, nursing and expectant mothers and invalids, whose claims are recognised by the Milk (Priority) Order of the Ministry of Food.

Generally speaking, the most economical use of milk is its consumption as fresh whole milk; but after the reasonable requirements of the community in this respect—and these must in no case be exceeded—have been met, there will be a surplus during the next few months. Moreover, there are farms so situated that there is no market for the product as liquid milk, and it is necessary for the producer to decide on the best use to which he can put his milk.

Roughly speaking, the milk not sold to consumers in the raw state is used for—

1. Conversion into dried or condensed milk which can be held in reserve for the winter when liquid milk is scarce.
2. Cheese-making.
3. Butter-making.
4. Feeding to stock.

In dried and condensed milk all the nutritive properties of the milk are retained, and evidence goes to prove that from the physiological standpoint dried milk is, with the proper addition to the diet of fresh fruit juice, an excellent substitute for fresh liquid milk; indeed, it is often found to be more easily digested by delicate children. The dried product possesses a certain advantage over condensed milk, since the latter, when once the tin is opened, offers a rich medium for the growth of organisms which may be introduced in unsanitary surroundings. There are certain difficulties, still unsurmounted, in preserving full cream dried milk which will keep for a long period, but half cream dried milk has excellent keeping qualities in addition to its other merits, and is possibly the most useful of all milk products. Both the condensation and drying of milk are factory processes, and cannot be carried out on a domestic basis. They are not, therefore, practicable outlets for small surpluses on remote farms where facilities for collection are not available.

Importance of Cheese.—Cheese has the next claim on the producer of milk. It is compact, durable, easily marketable, and contains fully two-thirds of the nutriment of the milk. The only important ingredient left in the whey is the sugar of the milk. Cheese-making can be successfully carried out with simple appliances on the farm, and even small surpluses of milk can be utilised in this way. Information on the methods suited to particular localities can be had from the County Council Education Authority, and the Board of Agriculture provide special leaflets on the question.* There is comparatively little waste of food material in cheese-making if the whey is fed to young stock. When

* Special Leaflet No. 75.—*The Manufacture of Cheese in Co-operative Dairies.*
 " " " 78.—*The Profitable Utilisation of Surplus Milk.*

a calf reaches the age of three weeks milk can be gradually replaced by a mixture of whey and meal.

The third alternative is the making of butter. In butter, however, only about one-half of the food contents of the milk are retained. Butter-making is, therefore, uneconomical unless full use is made of the skim milk, which retains the muscle and bone-building ingredients. Where there is no sale for skim milk it might be made into skim milk cheese, though the market for cheeses of this kind has not hitherto been uniformly good.* There is a large demand for skim milk in other food preparations, and the Ministry of Food now have under consideration the different claims of the various industries concerned.

The advantages of cheese-making as compared with butter-making have been summed up by the Board of Agriculture as follows :—

1. It gives direct to the human consumer a greater proportion and a greater variety of the food materials contained in the milk ;
2. It is usually more remunerative, and is likely to remain so in view of the rapidly increasing competition of margarine with butter ;
3. It gives a more durable product capable of prolonged storage ; and
4. The accompanying whey, though less nutritious than skim or separated milk, can still be used satisfactorily for the purposes of calf-rearing or pig-feeding.

It should be unnecessary at this stage to remind farmers that the feeding of milk to stock for the production of veal or pork is the most wasteful of all the uses to which it can be put. So little human food is produced in this way in proportion to the milk consumed that the practice cannot be too strongly condemned even in normal times. As stated earlier in this article, it is possible to begin to replace the feeding of whole milk to calves at the age of three weeks only.

In order, then, to secure a steady supply of milk for direct human consumption throughout the year, it is desirable to encourage the manufacture of preserved forms of milk, especially of dried milk. The second economy is to secure that all surplus milk that cannot be made into condensed and dried milk should, as far as possible, be made into cheese. A reduction in the manufacture of butter in favour of cheese is highly desirable, but where butter is the only possible means of utilising surplus milk no effort should be spared to conserve as much as possible of the separated or skim milk for human consumption. (*National Food Journal*, 24th April, 1918.)

AN Order (No. 480), dated 27th April, 1918, has been made by the Food Controller to the effect that :—

Order Continuing Temporarily the Cream Order, 1917.

The Food Controller hereby orders that the Cream Order, 1917†, shall continue in force until further notice, and that Clause 8 (*b*) of the Order shall be revoked.

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* An article on Skim Milk Cheese appeared in this *Journal*, May, 1917, p. 175.

† See this *Journal*, December, 1917, p. 1030.

AN Order (No. 401), dated the 5th April, 1918, has been made by the Food Controller amending the Grain (Prices) Order, 1917,* as follows:—

Order Amending the Grain (Prices) Order, 1917.

1. Clause 5 of the Principal Order is hereby revoked as on the 8th April, 1918, and the following Clause substituted:—

"(5) On the occasion of the purchase of any of the grains mentioned from any person who is a recognised dealer in grain and who is not the producer of the grain sold, the following provisions shall have effect:—

(i.) Where the purchase is made by a flour miller buying for the purpose of his mill, or is a purchase of barley made by any person, the maximum price shall be ascertained by adding 1*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order.

(ii.) Where a purchase is a purchase of grain other than barley, and is made otherwise than by a flour miller buying for the purpose of his mill, the maximum price shall be ascertained by adding 2*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order, provided that where the total quantity of a particular kind of grain purchased by one buyer from one seller does not in any period of seven consecutive days including the day of sale exceed 15 sacks, the maximum price in respect of each qr. so purchased shall be ascertained by adding 4*s*. per qr. to the price otherwise applicable according to the foregoing provision of this Order, and where such total quantity does not in that period amount to one sack, the maximum price in respect of each qr. so purchased shall be ascertained by adding 8*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order."

2. Nothing in this Order shall affect any contract made before the 11th April, 1918.

AN Order (No. 477), dated 24th April, 1918, has been made by the Food Controller to the following effect:—

An Order Revoking the Wheat (Seed) Order, 1918.

The Food Controller hereby orders that as from the 1st May, 1918, the Wheat (Seed) Order, 1918,† shall be revoked, but without prejudice to any proceedings in respect of any contravention thereof.

THE following Order (No. 459), dated 20th April, 1918, has been issued as a Royal Proclamation, under Section 3 of the Military Service (No. 2) Act, 1918 (8 Geo. 5, c. 5) withdrawing certain Certificates of Exemption from Military Service.

A Proclamation Withdrawing Certain Certificates of Exemption from Military Service.

Whereas by Sub-section (1) of Section 3 of the Military Service (No. 2) Act, 1918, it is provided that His Majesty may, by Proclamation declaring that a national emergency has risen, direct that any certificates of exemption, other than certificates

* See this *Journal*, September, 1917, p. 673.
† See this *Journal*, February, 1918, p. 1299.

expressed to be granted or renewed solely on the ground specified in paragraph (*c*) or on the ground specified in paragraph (*d*) of Sub-section (1) of Section 2 of the Military Service Act, 1916, granted or renewed to any class or body of men specified in the Proclamation, or to men of any class or description so specified shall, as from the date specified in the Proclamation cease to have effect, and all certificates to which the Proclamation applies shall as from that date cease to be in force:

And whereas by Sub-section (2) of Section 3 of the Military Service (No. 2) Act, 1918, it is provided that while any such Proclamation remains in operation no application shall, except in so far as the Proclamation provides for the making of applications in any special cases, be entertained for the grant or renewal of the certificates mentioned in that Sub-section.

And whereas a national emergency has arisen:

Now, therefore, We, by and with the advice of Our Privy Council, in pursuance of the said Act and all other powers enabling Us in that behalf, do hereby direct that, as from the Twenty-fourth day of April, 1918, the certificates of exemption from military service specified in the First Schedule to this Our Royal Proclamation shall cease to have effect:

And in pursuance of the powers aforesaid We do hereby further direct that, notwithstanding that this Our Royal Proclamation is in operation, applications for certificates of exemption may be made in the special cases and subject to the provisions specified in the Second Schedule hereto.

FIRST SCHEDULE.

All certificates of exemption granted or renewed to men born in the years 1895, 1896, 1897, 1898, and 1899, exclusive of:—

(1) Certificates held by men who pursuant to their last authorised medical examination are at the date of this Proclamation:—

(*a*) In Medical Category C 2; B 3, or C 3 or in Grade 3, or

(*b*) In Medical Category B 1, B 2, B 3, C 1, C 2, C 3, or in Grade 2 or Grade 3 if in their case they are at the date of this Proclamation whole-time employed on a farm in farm work and are duly registered pursuant to the National Registration Acts, 1915 and 1918, as being occupied on agricultural work.

(2) Certificates granted or renewed on grounds of employment by Colliery Recruiting Courts to persons employed in or about coal mines.

(3) Certificates granted or renewed on grounds of employment by Port Labour Committees, or the London Shipowners and Transport Workers Military Service Committee to men who at the date of this Proclamation are pursuant to their last authorised medical examination in a medical grade or category other than Grade 1 or Category A.

(4) Certificates granted or renewed to persons who at the date of this Proclamation are duly qualified medical practitioners.

(5) Certificates expressed to be granted or renewed solely on the ground specified in paragraph (*c*) or on the ground specified in paragraph (*d*) of Sub-section (1) of Section 2 of the Military Service Act, 1916, that is to say, on the grounds of ill-health or infirmity or of a conscientious objection to the undertaking of combatant service.

SECOND SCHEDULE.

A. Application may be made to an Appeal Tribunal for the grant or renewal of a certificate of exemption solely on the ground specified

in paragraph (*a*) of Sub-section (1) of Section 2 of the Military Service Act, 1916, in respect of a man who has established to the satisfaction of the County Agricultural Executive Committee in England or Wales, or the Board of Agriculture for Scotland in Scotland, that he is a highly skilled agricultural worker, whole-time employed on a farm in farm work, and that he is irreplaceable and essential to the cultivation of the farm, provided that the application is lodged in accordance with the Regulations for Tribunals not later than the 15th day of May, 1918.

B. Application may be made to a Tribunal for the grant or renewal of a certificate of exemption :—

(i) Solely on the ground specified in paragraph (*b*) of Sub-section (1) of Section two of the Military Service Act, 1916, in respect of a man who establishes to the satisfaction of the Tribunal that he is the last surviving son of a widow, of whom at least one son has died as a result of wounds received in, or sickness contracted by, service with Our Armed Forces during the present War ; or

(ii) Solely on the ground specified in paragraph (*d*) of Sub-section (1) of Section two of the Military Service Act, 1916, in respect of a man whose certificate was expressed to be granted or renewed on such ground in addition to a ground specified in paragraphs (*a*) or (*b*) of that Sub-section ;

provided that such application is lodged, in accordance with the Regulations for Tribunals, not later than the Eighth day of May, 1918.

Given at Our Court at Buckingham Palace, this Twentieth day of April, in the year of our Lord One thousand nine hundred and eighteen, and in the Eighth year of Our Reign.

God Save the King.

EXPLANATORY NOTES.

Note 1.—This Proclamation operates to withdraw only certificates of exemption granted by Tribunals and by Government Departments under Section 2 of the Military Service Act, 1916. It does not affect protection certificates issued under the Schedule of Protected Occupation M.M. 130 (Revised), namely, Forms 3476A, 3476B and 3476 W.M.V., to men employed on Admiralty, War Office or Munitions work, or protection certificates issued to men employed by Railway Companies.

Note 2.—Certificates of exemption to which this Proclamation applies cease to be in force on the 24th April, 1918. The holder of such a certificate must forthwith transmit the certificate, together with a notification that it has ceased to be in force, to the Local Office of the Ministry of National Service for the area in which the holder of the certificate is registered under the National Registration Acts, 1915 and 1918. If any man fails without reasonable cause or excuse to do so he is guilty of an offence under the Military Service (No. 2) Act, 1918.

THE following Circular (No. R. 181), dated 23rd April, 1918, has been issued by the Local Government Board :—

Local Government Board Circular Letter: Proclamation Withdrawing Certificates of Exemption.

SIR,—1. I am desired by Mr. Hayes Fisher to enclose a copy of a Proclamation* which has been issued withdrawing certificates of exemption held by men born in the years, 1895, 1896, 1897, 1898, and 1899, with certain exceptions.

Provision is made in the Proclamation that applications for exemption may be made by certain classes of men coming within the terms of the Proclamation.

* See above.

The classes are specified in the Second Schedule to the Proclamation and are—on the ground of occupation, agricultural workers who comply with certain conditions; on the ground of serious hardship, the only sons of widows who have lost one or more sons in the present war; on the ground of conscientious objection, men who hold certificates granted on that ground as well as on the ground of occupation or of hardship.

The only men in agriculture whose certificates are withdrawn by the Proclamation are men in Medical Grade 1 or Category A, or men who have not been medically graded or classified.

As regards other classes, the Proclamation withdraws the certificates of men in Medical Grades 1 or 2 or in Categories A, B 1, B 2, or C 1, or men who have not been medically graded or classified.

2. It is imperative that any applications made under the Proclamation shall be dealt with immediately. Regulations have therefore been prepared (copies are enclosed)* under which any application in respect of a man coming within the Second Schedule of the Proclamation shall be made direct to the appropriate Appeal Tribunal, and shall be dealt with by that Tribunal in the same manner as applications made direct to them.

Applications concerning the sons of widows or on the ground of conscientious objection have to be delivered not later than the 8th May next, and concerning agricultural workers not later than the 15th May. Mr. Hayes Fisher hopes that the Appeal Tribunals will make arrangements for deciding any such applications within fourteen days of their receipt. He will be glad to receive not later than the 8th June a statement respecting the cases in the form which is enclosed.*

3. It will be observed from the Second Schedule that, in the case of agricultural workers, an application may be made only in respect of a man who establishes to the satisfaction of the County Agricultural Executive Committee that he is a highly skilled agricultural worker, whole-time employed on a farm in farm work, and is irreplaceable and essential to the cultivation of the farm.

An application of this kind will therefore not be valid and should not be entertained unless it is accompanied by a statement or certificate from the Agricultural Executive Committee that they are satisfied that the conditions are fulfilled.

Directions to the Agricultural Executive Committees will be issued by the Board of Agriculture.

As to the interpretation of "whole-time on a farm in farm work," reference may be made to the following quotation from the Memorandum R. 144, of the 24th July last† :—

> "Employment 'whole-time on a farm on farm work' is intended to cover the production of essential food supplies, and therefore includes the work of men whole-time employed on a market garden exclusively in production of food of a kind and quantity of national importance. It is not to include work on a poultry farm or on a market garden for the production of flowers or fruit.
>
> "Farm work covers the employment of men in agriculture as thatchers or as drivers of engines or motor tractors (including tractor ploughmen); but these men, as others, must comply with the conditions stated above . . ."

Mr. Hayes Fisher suggests that, as regards the agricultural cases, the Tribunal (a small committee or committees of three to five members will be best) should first go through the cases with the National Service

* Not here printed. † See this *Journal*, August, 1917, p. 569.

Representative and the Agricultural Representative. It will probably be found that in some cases exemption may be given, with the concurrence of the National Service Representative, without a hearing. In those cases which it is found necessary to hear, notice of hearing should be issued forthwith. No application can be refused without a hearing.

4. In dealing with these cases it must be borne in mind that the general rule which the Government have adopted is that the men of the ages and medical standards covered by the Proclamation are to join the Colours; that an exception to this rule is justified only if it can be shown that special conditions prevail; and that, therefore, it must be shown, in the case of an agricultural worker, that it is clearly in the national interest that he should be allowed to continue in his civil employment, taking due account of all other possible measures for carrying on the work which is done by him, and, in the case of the only son of a widow, that there would be such serious hardship if the man were called to the Colours as to justify an exception to the general rule.

I am, etc.,
(Signed) H. C. MONRO,
Secretary.

THE following Circular Letter (No. 66/L1), dated 26th April, 1918, was addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Military Service: Royal Proclamation of the 20th April Withdrawing Exemptions.

SIR,—1. By Royal Proclamation issued 20th April, 1918, all certificates of exemption or protection granted or reviewed to men employed in agriculture, who are medically classified Grade 1 or Category "A," or who have not yet been medically graded or classified, will cease to have effect as from the 29th April, 1918, provided such men were born in the years 1895, 1896, 1897, 1898, or 1899.

2. Men of all other medical categories or grades, who are at the date of the Proclamation whole-time employed on a farm on farm work, and are duly registered under the National Registration Acts 1915 and 1918 as being employed on agricultural work, are not affected.

3. Applications for certificates of exemption in special cases may be made in respect of men referred to in paragraph (1) of this Memorandum, provided any man, by or on behalf of whom such application is made, has established to the satisfaction of the County Agricultural Executive Committee concerned, that he is *a highly skilled agricultural worker, whole-time employed on a farm on farm work and that he is irreplaceable and essential to the cultivation of the farm.* An application in respect of any such man or men must be lodged *with the Appeal Tribunal* in accordance with the Regulations for the time being in force, *not later than the 15th day of May*, 1918.

An application made on the ground referred to in this paragraph will only be considered by the Appeal Tribunal of the area in which the man is employed, if it is accompanied by a declaration from the County Agricultural Executive Committee for the area in which the man is employed, that they are satisfied that the conditions specified

above are complied with. Applications will therefore be submitted in the first instance direct to the Executive Committee concerned.

4. Agricultural Executive Committees will observe that very onerous duties have been placed upon them under this Proclamation which will require their immediate attention and necessitate frequent sittings in view of the short period of time allowed for the making of appeals. This matter should be treated as the most urgent and important work to be performed by Agricultural Executive Committees at the moment, and if necessary extra clerical assistance should be temporarily engaged at once to cope with it.

5. The Department desire that the following procedure should be adopted in every county :—

(a) If possible, the names of the men falling within the terms of the Proclamation should be obtained at once by your Committee from the Regional Representative of the National Service Department, whose names and addresses are given in Appendix A.*

(b) A specimen form (F.P. 250 L.1)* is enclosed to be used by every farmer making application for leave to appeal for the exemption of any man coming within the terms of the Proclamation, which it will be noted include men in Grade 1 or Category "A," or *men not medically examined*, who fall within the age limits named. A somewhat similar form (F.P. 251 L. 1) is enclosed* for use in the case of every market gardener.

(c) It is essential that these forms should be sent to all farmers in the county who, as a result of the information obtained under paragraph (b), or from inquiries received, are known to have in their employment men falling within the terms of the Proclamation.

(d) Committees should arrange special meetings during the next 14 days to consider applications received from employers for leave to appeal for exemption for the men concerned. The general decision of the Cabinet is that the men of the ages and medical standards covered by the Proclamation are to join the Colours. An exception to this rule is to be made only if it can be shown that special conditions prevail, and therefore it must be proved, in the case of an agricultural worker, that it is in the national interest that he should be allowed to continue in his civil employment, taking due account of all other possible measures for carrying on the work which is being done by him. Agricultural Executive Committees must recognise their responsibility in this matter, and only sanction appeals to the Tribunal in cases which clearly satisfy the conditions laid down in paragraph 3 above.

(e) In cases in which the Committee are satisfied that the man concerned is a highly skilled agricultural worker whole-time employed on the holding in farm work, that he cannot be replaced, and that he is essential to the cultivation of the holding, a declaration signed by the Chairman should be issued in the form attached (F.P. 249 L.1).* The form should be sent to the employer and a copy to the Appeal Tribunal of the area in which the man is employed ; at the same time the employer should be notified of the address of the Appeal Tribunal with whom the application should be lodged.

(f) As to the interpretation of the term "employment whole-time on a farm on farm work," attention is drawn to the following quotation from the Memorandum R. 144 of 24th July, 1917* :—"Employment 'whole-time on a farm on farm work' is intended to cover the production of essential food supplies, and therefore includes the work of men whole-time employed on a market garden exclusively in the production of food of a kind and quantity of national importance. It is not to include work on a poultry farm or on a market garden for the production of flowers or fruit. Farm work covers the employment of men in agriculture as thatchers or as drivers of engines or motor tractors (including tractor ploughmen) ; but these men, as others, must comply with the conditions stated above if vouchers are to be issued in respect of them." This definition remains in force.

* Not here printed.

(g) Instructions are being issued by the Local Government Board to Tribunals which provide that a Committee of 3 or 5 members of the Tribunal may review the cases referred to it, with the Representatives of the Ministry of National Service and Board of Agriculture. It is expected that in a number of cases exemption may be given with the concurrence of the National Service Representative without a hearing, but in cases where a hearing is essential, notice will be given by the authorities concerned. No application can be refused without a hearing. The Tribunals have been requested by the Local Government Board to make arrangements for deciding applications referred to them within 14 days of their receipt.

(h) Committees should post to the Food Production Department, each Wednesday and Saturday, particulars of the cases dealt with during the period on the form (F.P. 252 L.1)*, of which a specimen is attached.

All appeals must be lodged with the Tribunal before 15th May, therefore it is important that applications should be received and dealt with by your Committee by 11th May at latest.

Owing to the very urgent circumstances Committees are authorised to arrange for the necessary printing to be done locally.

I am, etc.,
(Signed) A. LEE,
Director-General of Food Production.

THE following Memorandum (No. 59/L1), dated 15th April, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Substitution in Agricultural Cases. Inquiries have been addressed to the Department from time to time by Agricultural Executive Committees as regards the action they should take in the cases of men fit for general service for whom suitable substitutes could be provided. The question has recently been further under consideration, and in view of the urgent need of the Army for men fit for general service an arrangement has been arrived at with the Ministry of National Service whereby it should be possible to release a number of men without depleting the man-power of any farm.

The arrangement is outlined in the enclosed copy of a Circular Letter* issued by the Ministry of National Service, which indicates generally the procedure that is most likely to secure the release of men, while safeguarding the interests of food production.

It will be observed that the powers of the Agricultural Executive Committees under this Department's Memorandum F.P. 83 are in no way affected by the present arrangement, as their consent has still to be obtained before any man, who was on 1st June, 1917, whole-time employed on a farm on farm work of national importance and is still so employed, can be posted for service with the Colours or called up for medical examination or re-examination. Agricultural Executive Committees may, however, be asked to indicate the individual men whom they would be prepared to release for military service upon the provision of substitutes, and they will therefore have ample opportunity of satisfying themselves that the substitutes offered are suitable, and consequently that the amount of skilled labour on farms is safeguarded. Further-

more, it is clearly indicated that the men serving in Agricultural Companies will not be offered in substitution, so that labour from this source will continue to be available.

In view of the present military situation, it is hoped that the Agricultural Executive Committees will co-operate cordially with the local representatives of the Ministry of National Service in the working of this scheme, which has for its object the securing of more men for the Army without depleting the amount of skilled labour available for farm work.

THE following Memorandum (No. 54/L2), dated the 3rd April, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Soldier Labour.

Copies of Army Council Instruction 322* of 1918, relating to the employment of soldiers on agricultural work, are enclosed for the information of Agircultural Executive Committees. It will be observed from paragraph 1 that, as from the date provided in that paragraph, farmers will be required to provide board and lodging for soldiers employed in agriculture and to pay for their services at the local "living-in" rate, with a minimum of 10*s*. per week.

The application form (F.P. 71) for soldier labour is being amended, and copies will be forwarded to all Committees as soon as possible. In the meantime the existing copies of this form should be used, a slip being added explaining the alteration as regards board and lodging.

THE following Notice was issued in April by the Food Production Department of the Board :—

Appeal for Village Forewomen.

Women with agricultural experience are urgently required by the Food Production Department, to act as "Village Forewomen" to lead and arrange the work of gangs of women on the land during the coming season. They will be paid a minimum wage of 25*s*. a week, and must enrol in the Women's Land Army for six months and be prepared to work wherever they are required throughout England and Wales. Applications for forms of enrolment should be sent in writing to the Women's Branch, Food Production Department, 72, Victoria Street, S.W. 1.

THE Board of Agriculture announce that an arrangement has been made with the Ministry of National Service and the War Office for a definite number of 30,000 Grade 1 men to be made available from agriculture for military service not later than 30th June.

Agriculture and Recruiting.

It is hoped that the large majority of these men will be recruited under the Proclamation of 19th April, 1918, calling up men born in the years 1895-1899, but, if the full number of men is not obtained under this Proclamation, it will be necessary to obtain the remainder from men up to 31 years of age.

It is expected that aditional labour, including a large number of prisoners of war, will be made available for agriculture to take the place of the men urgently required for immediate military service.

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* Not here printed.

THE following Notice was issued by the Agricultural Wages Board on 13th May :—

District Wages Committees.

District Wages Committees have now been established for each of the 39 areas into which England and Wales was divided for this purpose under the provisions of the Corn Production Act. The District Committees are now generally engaged in formulating their recommendations to the Agricultural Wages Board. The reports of their proceedings in the Press appear in some cases to have given rise to the belief that the decisions of the Committees at once become operative. This is not the case. Any recommendation of a District Committee has to be sent up for consideration to the Agricultural Wages Board, who alone have power, under the Act, to fix minimum rates of wages. When the Board have come to a decision on a recommendation from a District Committee they are bound to give formal notice of any rate which they propose to fix, and to allow one month, during which objections to their proposals may be made, before an Order is made legally fixing the rate. The Board, however, have recommended that employers should, in all cases, agree with their workers that any rate which may be so fixed shall be retrospective as from the end of March last.

Agricultural Wages Board: New Minimum Rates of Wages for Male Workmen in Norfolk.

THE Agricultural Wages Board (England and Wales) give notice that they have fixed the following minimum rates of wages for male workmen of 18 years of age and over employed in agriculture for time work in the area comprising the administrative county of Norfolk and the county boroughs of Norwich and Great Yarmouth, that is to say :—

(1) The wages payable for employment in summer (as hereinafter defined) of male workmen in agriculture of 18 years of age and over shall be not less than wages at the minimum rate of 30*s*. for 54 hours (exclusive of meal times).

(2) The wages payable for employment in winter (as hereinafter defined) of male workmen in agriculture of 18 years of age and over shall be not less than wages at the minimum rate of 30*s*. for 48 hours (exclusive of meal times).

(3) The above minimum rates shall apply to all male workmen of 18 years of age and upwards who are wholly or partly employed in agriculture within the meaning of Section 17 (1) of the Corn Production Act, 1917, in the above-mentioned area during such time as they are so employed.

(4) For the purpose of the above minimum rates employment in summer shall be deemed to be employment during the period commencing on the first Monday in March and terminating on the last Sunday in October; and employment in winter shall be deemed to be employment during the rest of the year.

(5) The above minimum rates shall come into operation on the 20th day of May, 1918.

THE following Memorandum (No. 48/C2), dated 2nd May, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Rook Shooting.

Complaints are made as to the excessive number of rooks, and it is suggested that the services of rifle clubs might be enlisted with a view to using ·22 miniature

rifle cartridges, of which there are large stocks available, for the purpose of shooting the birds.

The Department ask that the Agricultural Executive Committees will urge the owners of rookeries to invite members of the local rifle clubs to undertake such shooting.

Supplies of ·22 cartridges can be obtained on application to the Rabbits and Game Advisory Committee, Ministry of Food, 14, Upper Grosvenor Street, London, W. 1.

The wholesale destruction of rooks, however, is not advocated, having regard to the undoubted advantage which farmers derive from a limited number of the birds.

Names and Routes of the Super King's and Board's Premium Stallions.

THE Board desire to give notice that the particulars of the Routes of the Stallions to which premiums have been awarded by the Board for the service season 1918, together with the names and addresses of the owners of the stallions, and of the members of the Stallion Committees which have been appointed to supervise the service arrangements, will not be published in this *Journal*. Copies of a list of the names and routes of these stallions may be obtained on application to the Board's Offices, 4, The Sanctuary, Westminster, London, S.W. 1.

Leaflets in 1918.

SINCE the date of the List given on p. 1052 of the *Journal* for December, 1917, the following Leaflets have been issued in the Permanent Series:—

No. 312.—*Blossom Wilt of Apple Trees.*
,, 319.—*Apple Capsids.*

The following Food Production Leaflets have been issued:—

F.P. No. 18.—*Seed Testing for Farmers at the Official Seed Testing Station.*
,, 21.—*Wart Disease of Potatoes: Report on the Immunity Trials at Ormskirk in 1915–16–17.*
,, 23.—*Blast Furnace Flue-Dust as a Potash Manure.*
,, 25.—*Economy in the Feeding of Dairy Cows.*
,, 26.—*Economy in the Use of Seed Grain.*
,, 28.—*Leaflet on Potato Wart Disease, specially prepared for Children who cultivate School Gardens and for Amateurs in Gardening.*
,, 29.—*Suggestions to Farmers in the Breaking up and Cropping of Grass Land.*
,, 32.—*Spring and Summer Spraying of Fruit Trees in Small Plantations.*
,, 33.—*Fertilisers for Farm Crops in 1918.*
,, 34.—*Canning of Fruit and Vegetables.*
,, 35.—*Varieties of Oats for Spring Sowing.*
,, 36.—*War-time Allotments.*
,, 37.—*Soiling Crops for Dairy Cows.*
,, 38.—*Wheat Growing.*
,, 39.—*The Control of Pests of Fruit Trees in Gardens and Small Orchards.*
,, 40.—*The Stock-carrying Capacity of Grass and Tillage Lands.*
,, 42.—*The Cultivation of Buckwheat.*
,, 43.—*Practical Hints on Potato Spraying.*

In addition, the information in the following Permanent Leaflets has been revised and brought up to date :—

No. 23.—*Potato Disease.*
,, 46.—*Stem Eelworm.* (This has been re-written.)
,, 56.—*Apple Canker.* (This has been re-written.)
(This was previously entitled "*Canker Fungus.*")
,, 65.—*Small Ermine Moth.*
,, 70.—*Treatment of Neglected Orchards.*
,, 80.—*Use of Artificial Manures.*
,, 93.—*Farmyard Manure.*
,, 112.—*Weeds and their Suppression.*
,, 142.—*Calf Rearing.* (This has been re-written.)
,, 170.—*The Use of Lime in Agriculture.*
,, 173.—*Potato Growing.*
,, 193.—*Dry Rot of Potatoes.* (This has been re-written.)
,, 226.—*Broom-rape.*
,, 231.—*Cheese-making for Small Holders.*
,, 254.—*The Use of Seaweed as Manure.*
,, 255.—*The Workmen's Compensation Act, 1906.*
,, 264.—*The Cultivation of Onions.*
,, 277.—*Tuberculosis in Farm Stock.*
,, 285.—*Bacon Curing on the Farm.*
,, 296.—*Potato Growing in Allotments and Small Gardens.*
,, 297.—*Seed Testing.*

The following Leaflets, formerly issued in the series of Special Leaflets, have been added to the Permanent Series :—

No. 315.—*Suggestions to Allotment Holders for General Cropping during the Spring and Summer Months.* (Formerly Special Leaflet No. 26.)
,, 316.—*Sorghum as Fodder.* (Formerly Special Leaflet No. 53.)
,, 317.—*The Rearing of Chickens.* (Formerly Special Leaflet No. 54.)
,, 318.—*Economy in Using Potatoes.* (Formerly Special Leaflet No. 67.)
,, 320.—*Manuring Cottage Gardens and Allotments.* (Formerly Special Leaflet No. 56.)

The following Food Production Leaflets have been revised and brought up to date :—

F.P. No. 2.—*Credit for Farmers.*
,, 5.—*Notes on Breaking up Grass Land.* (This has been re-written.)
,, 11.—*Hints on Purchasing Seed Potatoes.*
,, 19.—*Pig Feeding in War Time.* (This has been re-written.)

The following Leaflet, formerly in the series of Special Leaflets, has been transferred to the Food Production Series :—

F.P. No. 41.—*The Making of Fruit Pulp.* (Formerly Special Leaflet No. 31.)

The following Leaflet, which had been withdrawn from circulation, has been re-written and re-issued :—

No. 114.—*The Feeding of Poultry.*

The following Leaflets have been withdrawn from circulation :—

No. 92.—*Bunt and Smut.*
,, 120.—*Peach Leaf-Curl.*
,, 217.—*The Provision of Allotments.* (This is replaced by F.P. Leaflet No. 36.)
,, 247.—*Shot-hole Fungus.*
,, 256.—*A Disease of Narcissus Bulbs.*

The following Special Leaflets have been withdrawn from circulation :—

No. 17.—*Supplies of Pit Timber.*
,, 21.—*The Manufacture of Charcoal.*
,, 49.—*The Selection of Wheats for Spring Sowing.*

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s.* and the cost of the telegrams, computed at 9*d.* per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 4.30 p.m., and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director, Meteorological Office, South Kensington, London, S.W. 7, with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than 6 consecutive days, during which the forecasts are to be sent.

Maximum Retail and Wholesale Prices: A Correction.

The Board desire to correct a printer's error which appears on p. 126 of this *Journal* for last month. The particulars of the home-grown grain of the 1917 crop given thereon should be included under a side heading "**Grain,**" which word was omitted when the *Journal* was in the Press.

Prosecutions of Farmers, etc., under Statutory Rules and *Orders*.

Birmingham.—Andrew Huntchback, Baschurch, Salop, on sales of watered milk, £90.

Bridgnorth.—John Lucas, farmer, on sales of seed potatoes (and sales otherwise than by weight), £11 19*s.* 6*d.*, including costs.

Darlington.—Fines amounting, with costs, to £100 were imposed upon James Dent, farmer and butcher, Goosepool, for having slaughtered sheep and cows contrary to Orders and failed to keep records.

Finsbury.—Edward R. Morris, Paul Street, on sales of milk diluted 31 per cent., £50.

Greenwich.—The West London Dairy Company, on sales of watered milk at Deptford, £40, with £5 15*s.* 6*d.* costs. The depot staff was said, in defence, to have been since "cleared out."

Hendon.—Thomas Whiting, Dollis Farm, Mill Hill, on a sale of watered milk, £25.

Leytonstone.—Alfred Cleall, roundsman, on sales of milk short measure, £10 or 61 days' imprisonment.

Stratford.—Henry Payne, Beachcroft Road, employed by the Upton Park Co-operative Society, for sales of short-measure milk, £10 or 61 days' imprisonment.

Woburn.—John Edwin Andrews, Charlton Cross Farm, Toddington, was summoned for contravening the Wheat, Rye and Rice (Restrictions) Order, 1917, by permitting a stack of wheat to be damaged by rats.

Of 60 or 70 qr. 5 or 6 bush. had been destroyed, and witnesses computed there must have been from eighty to hundred rats in the stack. The defendant was fined £50.

Woolwich.—Victor Johnson, Footscray Road, New Eltham, and Harry Furber, Southend Farm, on sales of milk, £10 and £25 respectively, the latter with 5 guineas costs. (*National Food Journal*, 24th April, and 8th May, 1918.)

NOTICE OF BOOKS.

The Wheat Problem (3rd Edition). Sir William Crookes (London: Longmans, Green & Co., 1917, 3*s*. 6*d*. net).—This work is based on remarks made in the Presidential Address to the British Association for the Advancement of Science, delivered by Sir William Crookes at Bristol in 1898. A full report of the Address, which at the time attracted such widespread attention, appears in this edition, and is followed by a chapter on the Recent Developments of the Wheat Problem, the statements made in the original Address being reviewed in the light of subsequent events, especially in regard to the War, while some of the criticisms to which his Address has been subjected are examined.

The contention of the author in 1898 was that the wheat-producing soil of the world was totally unequal to the strain which was being put upon it, and that, unless the aid of science was called in to increase the acreage yield of wheat, dearth, and possibly famine, was a possible contingency in the near future. Wheat is pre-eminently a crop demanding large quantities of nitrogen, and as this constituent is mainly of atmospheric origin, it needs to be "fixed" before it can be properly utilised as a plant food. The future problem, therefore, is to devise methods of fixation which will enable the nitrogen supply of the world to be conserved and utilised to the fullest possible extent with a view to a more intensive cultivation of the wheat-growing areas.

In his Presidential Address of 1898, as reprinted in this book, the author first gives a statistical survey of the position of the principal wheat-producing countries in the world, and after showing the urgent necessity for obtaining an increased acreage yield by the application of nitrogenous fertilisers, owing to the gradual appropriation of all the available land for wheat-growing purposes, states the case for nitrogen fixation. In the following chapter a more general review of the present position is made, and the methods of nitrogen fixation described more in detail.

An introduction to the volume is contributed by Lord Rhondda, who briefly mentions a few instances of what science has done and is capable of doing for agriculture, especially in regard to making the country more self-supporting in the matter of foodstuffs. A chapter on the Future Wheat Supplies, by Sir Henry Rew, K.C.B., dealing with the world's supply of cereals during the War, the fluctuations which have occurred in the different countries during this period, and the past position and the outlook of England in the production of cereals, concludes the volume.

Note.—The question of Nitrogen Fixation is also dealt with in a pamphlet on "The Nitrogen Problem and the Work of the Nitrogen Products Committee," issued by the Ministry of Munitions, and obtainable from the Stationery Office, price 2*d*., excluding postage (see this *Journal*, January, 1918, p. 1254).

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for April, 1918, issued by the International Institute of Agriculture, contains the following estimates of the production of cereal crops in the Southern Hemisphere :—*Wheat.*—In Argentina, Uruguay, Union of South Africa, Australia, and New Zealand the production in 1917-18 is estimated to amount to 46,134,000 qr. against 29,683,000 qr. in 1916-17, or an increase of 55·4 per cent.. the area sown showing an increase of 2·0 per cent. *Oats.*—The total production in Argentina and New Zealand is placed at 8,795,000 qr. in 1917-18, or an increase of 123·1 per cent. compared with 1916-17, when it amounted to 3,942,000 qr., while the area sown was greater by 19·3 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The areas estimated to have been sown with winter *wheat* in 1917-18, compared with the areas sown during the corresponding period of 1916-17, expressed as percentages, are as follows:—Denmark 102, Spain 98, France 107, England and Wales 115, Scotland 122, Luxemburg 105, Canada 96, United States 105, British India 110, Japan 118, Tunis 113; with *rye* :—Denmark 118, Spain 108, France 96, England and Wales 103, Luxemburg 95, United States 145; with *barley* :—Spain 108, France 92, England and Wales 100, Japan 99, Tunis 111; with *oats* :—Spain 123, France 106, England and Wales 100, Tunis 120.

France.—According to the official report, the weather during March was generally fine and dry, and although snow fell in many districts during the early part of the month, the conditions were on the whole favourable for the growing crops and spring sowing. The appearance of the autumn sown crops continues satisfactory, and spring sowing is in some districts well advanced. Potato planting is nearly completed, but meadows have, on the whole, suffered somewhat from drought. (*London Grain, Seed and Oil Reporter*, 13th April, 1918).

The Ministry of Agriculture on the 18th April issued an estimate of the crop conditions on the 1st April, as follows (figures for 1st April, 1917, in brackets) :—Winter wheat, 73 (54); winter barley, 72 (56); winter oats, 70 (52); and rye, 74 (62). (80 = good, 60 = fairly good, 50 = passable.) (*Broomhall's Corn Trade News*, 19th April, 1918.)

United States.—According to a report issued on 8th May by the statistician of the Department of Agriculture, the average condition of winter wheat and rye in the United States on 1st May was estimated as follows :—Wheat, 86·4 per cent., compared with 78·6 per cent. on 1st April, and 73·2 per cent. a year ago; and rye, 85·8 per cent., compared with 85·8 on 1st April, and 88·8 a year ago. The area still under winter wheat is estimated at 36,392,000 acres (or 13·7 per cent. less than the area planted in the autumn), compared with 27,430,000 acres last year, and the yield is estimated at 572,500,000 bush., compared with 418,000,000 bush. last year. The estimated yield of rye is 2,600,000 bush. against 60,145,000 bush. last year. Of spring ploughing 77·5 per cent. and of spring planting 60·8 per cent. was completed by 1st May, as against 72·4 per cent. and 58·7 per cent. respectively last year. (*The London Grain, Seed and Oil Reporter*, 9th May, 1918.)

India.—According to a special official forecast the yield of wheat in India for the season 1917-18 is estimated at 47,959,000 qr. as against the final forecast of 47,404,000 qr. for 1916-17 and 39,750,000 qr. for 1915-16. (*London Grain, Seed and Oil Reporter*, 30th April, 1918.)

Australia.—According to the reports of observers of the Commonwealth Meteorology Department the weather conditions during January varied from actual drought in some parts to serious floods in others. The wheat crop is disappointing, and the fruit yield is also light and has suffered in quality from excess of moisture. Grass and water have, with little exception, been sufficient and in many places abundant; stock is for the most part in very good condition, and the dairying industry most flourishing.

South Africa.—According to a report issued on the 15th February, excessive rains have fallen over a great part of the maize-growing area of the Union, and ploughing operations have been greatly hindered. Although the area under this crop was greater by 5 per cent. than a year ago, the condition of the crop at the end of January indicated a yield 18 per cent. below normal, owing to the excessive rains and attacks of rust and insects; and should there be no improvement during the ensuing months of the season the crop will probably not exceed 3,500,000 qr. compared with 4,000,000 qr. last year, and 5,000,000 qr. the previous year. (*London Grain, Seed and Oil Reporter*, 18th April, 1918.)

Live Stock in Australia.—According to a return issued by the State Statistician, the numbers of live stock in New South Wales on the 30th June last was as follows (figures for June, 1916 in brackets):—Horses, 733,828 (719,542); cattle, 2,765,767 (2,405,770); sheep, 36,179,730 (32,600,729); and pigs, 359,780 (281,158). (*The London Grain, Seed and Oil Reporter*, 23rd April, 1918.)

Agricultural Conditions in England and Wales on 1st May.

THE Crop Reporters of the Board, in commenting on agricultural conditions in England and Wales on the 1st May, state that spring sowing of corn has been practically completed under favourable conditions. Autumn wheat looks well and promising, though, owing to the cold weather, it has made but slow progress, and is in some places a little discoloured. Winter oats and beans are also quite satisfactory generally. The spring-sown crops are mostly coming up nicely, though oats are not in all cases so satisfactory; they, as well as the spring wheat, have been to some extent damaged by wireworm, which has been rather troublesome on newly-ploughed land. Warmer weather is needed to bring all the crops on, and in some districts rain is also required.

Potato planting has been nearly completed in the Fen districts; but a large area remains to be sown in Lancashire. Elsewhere the work is generally in full swing; it was in many parts interrupted by bad weather in the middle of the month. Generally the seed has been got in under very favourable conditions. Some damage to the earlies by frost is reported from the south-western counties.

Seeds are generally a good plant, though thin in the eastern counties; but the cold has allowed of very little growth during the

month. It is quite anticipated, however, that they will come on well with warmer weather, and under favourable conditions they should give a satisfactory yield.

Pastures are still mostly bare, and have not given much feed to the stock that have been turned out on to them. Like the clovers, they require warmth to bring them on. Live stock are generally healthy, but tend to be lean, as winter fodder is in many places finished, and grass is very backward.

Except in the latest districts lambing is practically over. The fall of lambs has been everywhere quite up to the average, and in many places over, while mortality, both among ewes and lambs, has been low, so that the season may be described as a good one. Hill flocks in the north have not done quite so well, as the weather was less favourable in their case.

The more skilled forms of labour are still very scarce, but with the assistance of soldiers, women, and prisoners of war, work is well advanced.

The following local summaries give further details regarding the agricultural labour in the different districts of England and Wales :—

Agricultural Labour in England and Wales during April.

Northumberland, Durham, Cumberland, and Westmorland. — On the whole the labour position is fairly satisfactory; skilled men are scarce, but there are fair numbers of substitutes A shortage of temporary labour for potato planting is, however, being experienced in some parts of Durham.

Lancashire and Cheshire.—The supply of labour is very short, temporary labour being almost unobtainable.

Yorkshire.—In some districts there is sufficient labour, and nearly everywhere there is no great scarcity, as many women, soldiers and German prisoners are available. The scarcity of horsemen seems to be the chief difficulty.

Shropshire and Stafford.—The supply of labour, both skilled and casual, is very short, and soldier labour is scarcer than it was. With the help of women and prisoners of war, however, the work has been kept well in hand.

Derby, Nottingham, Leicester, and Rutland.—Labour, both skilled and casual, is still very deficient, but with the help of soldiers, women, and prisoners of war work has been kept well in hand.

Lincoln and Norfolk.—The supply of labour varies in different parts of the division. There is generally a shortage, but it does not appear to be serious, and work is well advanced.

Suffolk, Cambridge, and Huntingdon.—In most districts there is about sufficient labour, and nowhere does the supply seem very much deficient, although skilled workers are scarce. Women have been available for potato planting.

Bedford, Northampton, and Warwick.—The supply of labour is generally short, though in many places it is sufficient with the assistance of soldiers and women.

Buckingham, Oxford, and Berkshire.—Labour is generally deficient, but with the help of soldiers, women and prisoners of war, farmers are able to carry on. One district of Oxfordshire reports increased wages for skilled cattlemen.

Worcester, Hereford, and Gloucester.—The supply of labour is still deficient, but the employment of women, soldiers and boys eases the position.

Cornwall, Devon, and Somerset.—The supply of labour, especially skilled, is short.

Dorset, Wiltshire, and Hampshire.—Labour is still short, but with the favourable season the work has been done with the assistance of women, soldiers, and in some cases, German prisoners. Skilled horsemen are scarce.

Surrey, Kent, and Sussex.—Skilled labour is deficient, but the work is kept in hand by the help of soldiers and women. Wages are being increased in some places.

Essex, Hertford, and Middlesex.—Though the supply of labour is deficient, the situation does not appear serious. Soldiers and German prisoners have greatly helped the situation. Wages have gone up.

North Wales.—Labour is very scarce, especially skilled, but with the assistance of soldiers, women and children for potato planting, farmers have been able to carry on, and work has been kept well in hand.

Mid Wales.—Labour, especially skilled labour, is very scarce, and becoming more so as men are called up, but, with the advantage of good weather and the help of women and German prisoners, farmers have been able to get well forward with their work.

South Wales.—Labour is very scarce, but owing to the favourable weather work is well forward.

THE following statement shows that according to the information in the possession of the Board on 1st May, 1918, certain diseases of animals existed in the countries specified :—

Prevalence of Animal Diseases on the Continent.

Austria (on the 20th March).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of February).—Anthrax, Swine Erysipelas.

France (for the period 17th March—6th April).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Germany (for the period 15th—28th February).—Foot-and-Mouth Disease, Glanders and Farcy, Swine Fever.

Holland (month of February).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 20th March).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 1st—7th April).—Anthrax, Black-leg, Foot-and-Mouth Disease (2,396 outbreaks), Glanders, Rabies, Sheep-pox, Sheep-scab, Swine Fever.

Norway (month of March).—Anthrax, Black-leg.

Sweden (month of March).—Anthrax.

Switzerland (for the period 1st—7th April).—Black-leg, Foot-and-Mouth Disease, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Rumania, Russia, Serbia, Spain.

The Weather in England during April.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.		Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 6th April:								
England, N.E. ...	43·1	0·0	0·60	15	+ 8	5	3·2	−2·3
England, E.	44·2	+0·1	0·37	10	+ 3	4	4·3	−1·4
Midland Counties ...	44·2	0·0	0·63	16	+ 7	5	3·5	−1·5
England, S.E. ...	45·3	−0·3	0·58	15	+ 7	5	4·4	−1·2
England, N.W. ...	44·2	+0·1	0·67	17	+ 6	5	3·4	−1·8
England, S.W. ...	45·3	0·0	0·95	24	+11	6	4·0	−1·2
English Channel ...	48·7	+1·0	0·43	11	+ 1	5	6·0	0·0
Week ending 13th April:								
England, N.E. ...	42·8	−0·7	0·39	10	0	6	1·4	−3·5
England, E.	43·5	−1·2	0·18	4	− 6	4	2·7	−2·5
Midland Counties ...	43·8	−0·9	0·41	10	0	5	1·5	−3·2
England. S.E. ...	45·6	−0·1	0·37	9	0	4	3·6	−1·7
England, N.W. ...	44·7	+0·3	0·32	8	− 4	4	1·9	−3·1
England, S.W. ...	45·6	−0·1	0·35	9	− 4	3	3·4	−2·1
English Channel ...	48·7	+0·7	0·24	6	− 4	3	7·0	+0·7
Week ending 20th April:								
England, N.E. ...	39·7	−5·0	0·44	11	+ 3	5	2·4	−2·8
England, E.	39·3	−6·4	2·14	54	+47	6	1·8	−3·8
Midland Counties ...	39·3	−6·4	0·98	25	+17	4	1·5	−3·5
England, S.E. ...	39·9	−7·0	1·17	30	+22	5	2·1	−3·6
England, N.W. ...	40·8	−5·0	0·27	7	− 3	2	3·9	−1·5
England, S.W. ...	40·6	−6·1	0·86	23	+11	4	3·4	−2·2
English Channel ...	43·7	−5·2	0·54	14	+ 4	3	2·2	−4·3
Week ending 27th April:								
England, N.E. ...	45·1	−0·9	0·02	1	−10	1	7·4	+2·1
England, E.	45·6	−1·8	0·32	8	− 4	3	5·9	+0·1
Midland Counties ...	47·6	+0·1	0·20	5	− 8	2	7·0	+1·6
England, S.E. ...	47·1	−1·4	0·34	9	− 5	3	5·0	−1·0
England, N.W. ...	47·6	+0·5	0·02	1	−13	1	9·8	+4·6
England, S.W. ...	47·8	−0·3	0·08	2	−17	1	9·5	+3·6
English Channel ...	49·1	−0·9	0·11	3	−11	1	9·5	+2·8

* 1 inch = 25·4 millimetres.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of April, 1916, 1917, and 1918.

—	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	53	11	86	2	73	9	52	8	71	8	56	0	33	7	59	10	—	
Norwich ...	53	4	82	6	73	1	51	2	68	10	56	3	31	3	57	0	45	7
Peterborough	53	7	82	7	72	7	51	7	66	7	56	5	31	6	58	11	43	10
Lincoln ...	55	5	83	8	72	9	54	3	69	4	56	2	31	5	58	1	48	0
Doncaster ...	53	1	84	11	72	9	54	8	70	1	56	0	30	0	56	9	—	
Salisbury ...	53	5	82	7	72	10	50	10	68	6	56	3	30	9	57	4	44	0

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).		Wheat.						Barley.						Oats.					
		1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan.	5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
,,	12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
,,	19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
,,	26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb.	2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
,,	9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
,,	16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
,,	23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar.	2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
,,	9 ...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
,,	16 ...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
,,	23 ...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
,,	30 ...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl.	6 ...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
,,	13 ...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
,,	20 ...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
,,	27 ...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May	4 ...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
,,	11 ...	55	5	78	0			53	5	64	11			33	1	55	2		
,,	18 ...	55	0	77	11			52	10	64	10			33	0	55	2		
,,	25 ...	54	7	78	0			52	9	64	9			33	4	54	11		
June	1 ...	53	3	78	0			53	9	65	11			33	3	54	11		
,,	8 ...	51	2	78	0			52	8	67	7			32	7	55	0		
,,	15 ...	48	10	78	2			50	9	75	6			32	1	55	1		
,,	22 ...	47	6	78	1			49	10	75	0			31	3	55	2		
,,	29 ...	46	3	78	3			49	1	73	11			30	10	55	1		
July	6 ...	46	3	78	1			45	6	69	5			30	8	55	2		
,,	13 ...	48	11	78	2			47	5	70	10			31	6	55	1		
,,	20 ...	51	6	78	3			48	8	72	1			32	3	55	2		
,,	27 ...	53	5	78	3			47	2	65	7			32	5	55	2		
Aug.	3 ...	55	1	78	2			46	1	73	6			32	9	55	0		
,,	10 ...	56	7	78	4			46	11	76	1			31	2	55	0		
,,	17 ...	58	1	78	7			48	0	68	11			30	8	55	6		
,,	24 ...	59	0	76	7			47	1	70	7			31	6	54	7		
,,	31 ...	59	4	72	1			48	5	60	4			30	5	49	0		
Sept.	7 ...	59	3	71	6			51	7	59	3			31	1	46	7		
,,	14 ...	59	11	70	7			52	6	57	2			30	9	45	0		
,,	21 ...	59	4	70	8			53	3	56	10			30	9	45	8		
,,	28 ...	58	10	70	6			54	1	58	5			31	1	44	7		
Oct.	5 ...	59	2	70	8			54	5	57	9			30	9	44	9		
,,	12 ...	59	7	71	0			53	10	58	5			31	6	44	5		
,,	19 ...	60	9	70	8			53	8	59	3			31	11	44	1		
,,	26 ...	62	10	70	10			54	6	60	1			32	10	43	0		
Nov.	2 ...	66	7	70	4			56	2	59	11			34	0	42	4		
,,	9 ...	69	8	70	3			58	0	60	2			35	8	42	11		
,,	16 ...	70	9	70	3			59	8	60	2			37	8	43	0		
,,	23 ...	70	8	70	2			61	8	59	9			39	7	43	1		
,,	30 ...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec.	7 ...	72	1	70	7			65	6	58	7			44	1	43	5		
,,	14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
,,	21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
,,	28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 30 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES OF LIVE STOCK IN ENGLAND AND WALES in April and March, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	April. First Grade.	April. Second Grade.	March. First Grade.	March. Second Grade.
	per cwt. live weight	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	75 3	70 0	75 5	70 1
Herefords	75 5	70 2	75 3	70 0
Shorthorns	75 2	70 0	75 2	70 0
Devons	75 3	70 2	75 0	70 1
Welsh Runts	75 0	—	75 0	69 6
Fat Cows	70 0	62 1	70 0	62 0
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	18	15¾	18	16½
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	21 0	21 0	18 9	18 3
Porkers	21 0	21 0	19 0	18 3
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	51 12	39 11	52 10	40 17
,, —Calvers ...	47 7	37 2	47 10	37 7
Other Breeds—In Milk ...	46 4	37 6	48 15	34 17
,, —Calvers ...	29 0	26 10	33 0	27 15
Calves for Rearing	3 18	3 0	4 3	3 4
Store Cattle :—				
Shorthorns—Yearlings ...	18 4	15 4	17 13	14 15
,, —Two-year-olds...	28 9	23 14	27 8	22 19
,, —Three-year-olds	38 18	33 5	36 10	31 16
Herefords—Two-year-olds...	33 4	27 18	29 14	26 0
Devons— ,,	29 14	24 16	28 16	24 1
Welsh Runts— ,,	28 17	24 7	27 7	23 3
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	80 5	66 5	79 10	67 8
Store Pigs :—				
8 to 12 weeks old	59 2	45 5	47 4	35 9
12 to 16 ,, ,, ...	95 2	79 3	77 5	59 4

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during April made prices equivalent to an additional 1½*d.* per lb. of the carcass weight for Downs, Longwools, Cheviots, Blackfaced and Cross-breds, and 1¼*d.* for Welsh and Cross-breds, and during March 1¾*d.* per lb. for Downs, Cheviots, Blackfaced and Cross-breds, 2*d.* for Cheviots, and 1½*d.* for Longwools and Welsh.

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in April, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	—	—	—	—	174 6	—
			120 lb.		120 lb.	
Cheshire	—	—	188 0	—	186 6	—
			per cwt.		per cwt.	
Canadian	130 6	—	130 6	—	130 6	—
BACON :—						
Irish (Green)	182 0	—	181 0	—	182 0	—
Canadian (Green sides)	—	—	177 0	—	178 0	177 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	35 7	33 1
Irish	33 9	—	32 10	31 3	33 3	32 3
Egyptian	22 6	19 9	21 6	20 4	23 3	22 3
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	150 0	140 0	125 0	120 0	142 6	132 6
Edward VII.	148 0	141 6	136 0	130 6	146 6	136 6
Up-to-Date	155 0	147 6	125 0	115 0	150 0	140 0
HAY :—						
Clover	—	—	—	—	154 6	147 0
Meadow	—	—	—	—	154 6	147 0

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in April, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	114 6	114 6	—	114 6	114 6
	2nd	114 6	114 6	—	114 6	114 6
Cow and Bull	1st	114 6	114 6	114 6	114 6	114 6
	2nd	114 6	113 6	108 6	114 6	114 6
Irish: Port Killed ...	1st	—	—	114 6	—	113 6
	2nd	—	—	114 6	—	114 6
Argentine Frozen—						
Hind Quarters ...	1st	129 6	129 6	129 6	129 6	129 6
Fore ,, ...	1st	99 0	99 0	99 0	99 0	99 0
Argentine Chilled—						
Hind Quarters ...	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
Canadian Frozen—						
Hind Quarters ...	1st	—	—	—	129 6	—
Fore ,, ...	1st	—	—	—	99 0	—
VEAL:—						
British	1st	114 6	—	114 6	114 6	114 6
	2nd	114 6	112 0	100 6	114 6	109 6
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	121 6	121 6	121 6	121 6	121 6
	2nd	121 6	121 6	121 6	121 6	121 6
English	1st	121 6	121 6	—	121 6	121 6
	2nd	121 6	121 6	—	121 6	121 6
Irish: Port Killed ...	1st	—	—	121 6	—	121 6
	2nd	—	—	121 6	—	121 6
Argentine Frozen ..	1st	121 6	121 6	121 6	121 6	121 6
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	—	—	121 6	—
Australian...	1st	—	—	—	—	—
Argentine...	1st	121 6	121 6	121 6	121 6	121 6
PORK:—						
British	1st	—	149 6	149 6	149 6	—
	2nd	—	149 6	—	149 6	—
Frozen	1st	—	—	—	149 6	—

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	APRIL.		FOUR MONTHS ENDED APRIL.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	27	49	113	229
Animals attacked	28	52	128	263
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	4	2	14	10
Animals attacked	6	6	36	19
Parasitic Mange:—				
Outbreaks	371	179	2,237	1,200
Animals attacked	705	364	4,323	2,523
Sheep Scab:—				
Outbreaks	21	26	222	348
Swine Fever:—				
Outbreaks	128	288	323	840
Swine slaughtered as diseased or exposed to infection	38	148	114	344

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	APRIL.		FOUR MONTHS ENDED APRIL.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	—	—	1	2
Animals attacked	—	—	1	2
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange:—				
Outbreaks	11	1	57	16
Sheep-Scab:—				
Outbreaks	16	27	151	193
Swine Fever:—				
Outbreaks	1	50	7	108
Swine slaughtered as diseased or exposed to infection	4	375	27	742

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THE REARING OF CALVES IN THE SUMMER AND AUTUMN OF 1918.

On many farms at the present time the rearing of calves is beset with exceptional difficulties owing, on the one hand, to the necessity—both from patriotic and economic motives—of restricting the use of milk for this purpose to the bare minimum, and, on the other hand, to the difficulty of obtaining adequate supplies of suitable feeding-stuffs with which to supplement this scanty allowance of milk. The difficulty is mainly limited to farms providing milk or dairy produce for human consumption, and, amongst these, varies according to the system of farming, being most acute on the milk-selling farm and least so on the butter-making farm. On the former, whole milk must be completely replaced by concentrated foods, whereas on the latter they are required only to supplement the supplies of separated milk available for rearing purposes. The cheese-making farm occupies an intermediate position, since, although whey is available, it has a lower feeding value than separated milk and requires a correspondingly richer or more abundant supplement in the form of concentrated feeding-stuffs.

In dealing with calf-rearing under present conditions there are thus three separate cases to consider, according as separated milk or whey or neither is available.

Before proceeding to outline methods of rearing that are adapted to the requirements of the times, a word may first be said as to the possible feeding-stuffs that are likely to be available in reasonable quantity for the purpose. Of home-grown crops use can be made of oats, beans, peas and linseed. In the case of purchased foods the most suitable that are likely to be available are linseed cake, palm kernel cake, coconut cake and fish meal. Maize meal, gluten feed and locust

bean meal may also be added to the list, although supplies will probably be very short. Milling offals as now produced are not equal to the finer offals of pre-war days, but may be used to a limited extent.

Under the existing arrangements for the rationing of feeding-stuffs the allowance of concentrated food for calves is restricted to calves up to 6 months old, and is not likely to exceed ¾ lb. per day, or, roughly, 1¼ cwt. per calf. The way in which the use of this should be distributed over the period for which concentrated food is required will vary according to the time of calving and the quantity of milk, separated milk, or whey that can be allowed for the calf. Assuming that the use of concentrated food is spread over 24 weeks, the above amount represents an average of rather less than 1 lb. per day, which permits of an allowance of 1 lb. per day until the calf is 18 weeks old (assuming the first 2 weeks on whole-milk alone) and thereafter of ½ lb. per day. Alternatively, the meal allowance might start with ½ lb. per day at 2 weeks old, rising fortnightly by ¼ lb. to 1½ lb. at 10 weeks old; and then decreasing fortnightly by ¼ lb. to ½ lb. per day, this rate then being continued until the calf is 6 months old.

Economy in the Use of Whole Milk.—The extent to which whole milk is used for calf-rearing must be determined primarily by the possibilities of profit offered by its use in other directions, such as the production of butter or cheese or direct disposal of milk for human consumption. One gal. of milk of average quality contains about 1¼ lb. of actual food material, which is equal in feeding value to about 2½ lb. of the best concentrated feeding stuffs (except linseed). The sale of milk even at 1*s.* per gal. thus means a realisation of nearly 10*d.* per lb. for the food material contained in it. Similarly, a price of 1*s.* 4*d.* per lb. for cheese or 2*s.* 6*d.* per lb. for butter is equivalent to a realisation of 13*d.* or 8*d.* per lb., respectively, for the foodstuff in the milk.* So long, therefore, as suitable feeding-stuffs can be obtained to replace it at a price of 2*d.* per lb. (= £18 13*s.* 4*d.* per ton) or thereabouts, which is, roughly, the current level of prices, there is obviously the strongest inducement to impose the narrowest limits upon the consumption of milk by calves where sale of milk or dairy produce is possible.

Experiments at Woburn and elsewhere have shown that it is possible to restrict the use of whole milk to the first two weeks of the calf's life, although it is more common to prolong

* It is assumed that 1 gal. of milk will give 1 lb. of cheese or ⅓ lb. of butter.

it to the third or fourth week. No fixed rule can be laid down, since the rearer must be guided by the progress of the calf and the supplies of milk available. The rate at which the change from milk to other diet is made should vary according to the character of the latter. In substituting separated milk for whole milk the change may, if necessary, be effected in three or four days, but, in passing to a whey or water diet, the change should be spread over a period of one or two weeks.

The allowance of milk from the second or third day after calving is usually from 4 to 6 qt. per day, given in three meals. A similar bulk of separated milk, whey or water should be used when the change is made, increasing gradually, as the calf grows, up to a maximum of about 2½ gal. per day. After about the sixth week the food can be given in two meals, morning and evening. From this time also a little good hay should be placed at the disposal of the calf and a little broken linseed cake placed in the feeding trough at midday.

Rearing with Separated Milk.—The essential difference between whole milk and separated milk is that the latter is almost entirely devoid of cream or butter-fat, hand-skimmed milk being intermediate between the two in this respect. In using separated milk, therefore, it is necessary to supplement it with a "cream equivalent" to make good the missing butter-fat. The simplest course would appear to be to add to the separated milk some cheaper fat or oil readily assimilated by the calf. This has been done in the past with considerable success by the use of cod-liver oil and other oils, but under present conditions both supply and cost of oils virtually preclude their use.

Recourse must be had, therefore, to the more ordinary concentrated feeding-stuffs. Certain of these, either alone or in mixtures, have been largely used with good results. Of the single feeding-stuffs the best results have been obtained with linseed and crushed oats.

Linseed possesses the special merits for this purpose of being rich in oil (30 to 40 per cent.) and of being easily converted into a porridge or gruel which is readily taken by the calf. For the same weight no other feeding-stuff provides as much nourishment. The import of linseed, however, is now controlled, and it is very unlikely that during the War any large quantity will be liberated for agricultural purposes, so that the dairy farmer with the necessary facilities will be well advised to grow a supply for his own use.

Before use the linseed should be boiled or ground. The latter is the simpler process, and can be readily effected in an ordinary steel grist-mill. For grinding with stones it will be advisable to add a small proportion of material such as maize, tail barley, or oats to prevent clogging of the mill by the pasty linseed.

For use the ground linseed should be scalded and stirred with boiling water at the rate of 1 qt. of the meal to 1 gal. of water. One pint of the porridge thus prepared added to 4 pt. of separated milk will suffice for a calf 4 to 5 weeks old. If the linseed be not ground it should be fed as a gruel prepared by boiling for 20 minutes with water at the rate of 3 gal. of water to 2 lb. of linseed, the latter being put in to soak overnight.

Linseed has a laxative tendency, and if this be too pronounced, it must be counteracted. Before the War an admixture of flour was commonly used for the purpose, but this is now inadmissible. Probably finely-ground maize meal or bean meal will serve the purpose.

The suitability of crushed oats for use along with separated milk has been demonstrated by experiments at Woburn and Kilmarnock and in Ireland.

In the Woburn experiments the calves were kept on whole milk until 3 or 4 weeks old, and towards the end of this period a handful of the crushed oats was mixed with the milk, and by the sixth week, when they were put entirely on to the separated milk, each calf was eating about 1 lb. per day along with 1½ gal. of separated milk. After the calves were 12 weeks old the oats were given dry. Calves will soon take to oats in this form if the oats are put into the pail just before the milk is finished.

In the Kilmarnock and Irish experiments a similar procedure was adopted with equally favourable results. Good results were also obtained in both cases with maize meal, but this was scalded and fed along with the separated milk in the form of a porridge.

Linseed cake meal has also been frequently used along with separated milk with satisfactory results, although, being poorer in oil, it is not as nutritious as whole linseed. Very little experience with palm kernel cake and coconut cake has been recorded, but there is no obvious reason why they should not prove satisfactory either alone or in admixture with other better-known foods.

The following practice is reported to be giving good results. New milk is given for the first two weeks, then half new and

half separated milk for the next two weeks, and afterwards separated milk, hay and a little linseed cake. Soon this cake is mixed with coarse pollards and palm kernel cake, flavoured with a little treacle water and locust bean meal.

In using meals the standard aimed at should be to give roughly 1 lb. of meal per gal. of separated milk, since the mixture should then have approximately the same feeding value as the gallon of whole milk which it replaces. The limiting factor however, is usually the effect upon the digestive system of the calf, which needs to be carefully watched and the feeding regulated accordingly. Moreover, the present restricted supplies of feeding-stuffs will hardly admit of feeding on this scale.

Rearing with Whey.—Whey is less well adapted for calf-rearing than separated milk, since it lacks not only most of the fat but also most of the albuminoids—so important for growth—of the original milk. The albuminoids remaining in the whey can be recovered and used for calf-rearing by the following method, which is successfully practised on many cheese-making farms in Cheshire:—

"Directly the whey is run from the curd, it is put into a large copper, and then heated over a quick fire. The albumen coagulates, and, just before boiling point, rises to the top in flakes, known as 'fleetings.' These are skimmed off as they rise. The whey must on no account be allowed to boil, or the 'fleetings' will sink to the bottom. To assist them to form it is often helpful to add 2 or 3 qt. of cold whey. This also checks the bulk from boiling.

"The boiler must be thoroughly cleaned out each day after use, and for this purpose a soft brick or rubbing-stone is best.

"The calves are fed twice a day as follows:—

1st	*week*—4	qt. milk per day.	
2nd	,, —6	,,	,,
3rd	,, —6	,,	half milk and half 'fleetings' per day.
4th	,, —8	,,	—2 qt. milk and 6 qt. 'fleetings' per day.
5th	,, —8	,,	—1 qt. milk and 7 qt. 'fleetings' per day.
6th	,, —8	,,	'fleetings' per day.

"Milk is rarely given after the calves are 6 weeks old. As soon as possible a little soft meadow hay is given to the calves, and after about a week's time a little bran as trough food. When the calves are 6 weeks old, and are getting no new milk, a little linseed cake and kibbled oats in equal proportions are added to the bran. Each calf is allowed about ½ lb. of the mixture. This is gradually increased to about 1 lb. per calf per day. The calves are put out to pasture when they are finally weaned (about 5 months old), generally about the

second week in June. The quantity of 'fleetings' is gradually reduced, and in the last week only one feed per day is given. The weaning process extends over two weeks. If the weather is very wet or cold the calves are brought in for a few nights, and get a little corn and cake, otherwise they are left out at pasture for about three months, and are entirely dependent upon the grass."

Recent experiments (1916, 1917) at Kilmarnock have demonstrated that calves can be reared fairly satisfactorily on ordinary whey supplemented by meals. In these experiments palm kernel cake meal alone, a mixture of oatmeal (2 parts) and fish meal (1 part), and a mixture of fine thirds (2 parts) and fish meal (1 part) were tested separately along with whey. The mixtures were given in the form of porridge, but the palm kernel meal was fed dry. The replacement of the whole milk by whey began when the calves were 3 week old, and the change was spread over 3 weeks, *i.e.*, the calves were 6 weeks old before the whole milk was entirely withdrawn. By this time each calf was receiving about 1 gal. of whey and ½ lb. of meal, and the consumption for the remainder of the experiment averaged about 1½ gal. of whey and 1 lb. of meal per day. Hay was fed from the time the calves were 5 weeks old, and linseed cake introduced into the ration three weeks later, starting with a very small quantity and increasing up to an average of ¾ lb. daily. In each case the rate of growth was not much lower than that with other calves reared on separated milk and crushed oats, but was obtained far more cheaply. The cheapest rearing was effected in each year by the use of palm kernel meal.

Mr. Lawrence, of Newton Rigg, reports good results by using a whey porridge made from a mixture of linseed cake meal (4 parts), gluten meal (3 parts) and locust bean meal (2 parts). The mixture (1¼ lb.) is scalded with 2 qt. of boiling water and mixed with 1½ gal. of whey when serving.

Rearing with Meals Alone.—Where neither separated milk nor whey is available the rearing, after whole milk is withdrawn, must be carried on with meals alone. The feasibility of this mode of rearing has been demonstrated in various experiments, but, unfortunately, in most cases the "milk equivalent" meals used have included ingredients (*e.g.*, oatmeal, wheat-flour) which are not now available for the purpose. The general practice is to feed the meals in the form of gruel, but recent experiments have shown that meals can be satisfactorily fed in the dry form, whereby much time and labour can be saved.

The following meal mixtures have been used in this way with success at the Midland Agricultural and Dairy College:—

1.	Linseed cake (finely nutted)	4 parts.
	Wheat germ meal	5 ,,
	Dried yeast..	1 part.

The mixture, with a little salt added, was given at the rate of ¼ lb. per calf daily at the beginning, and it was increased gradually, as there was no difficulty in getting the calves to take it. During the transition period a little was given as a gruel in the milk—an excellent gruel being obtained simply by soaking in water 12 hours before feeding.

2.	Linseed cake (finely nutted)	4 parts.
	Bean meal	5 ,,

This mixture, also with a little salt, was fed in the same quantity as the previous mixture and with equally satisfactory results.

The total quantity of new milk consumed by each calf was from 35 to 40 gal.; the allowance of dry meal was gradually increased from ¼ lb. per calf per day, when 4 weeks old, to 2¼ lb. per day when 14 weeks old. Hay was given from the sixth week onwards. During the period of experimental feeding (11 weeks) the calves in both lots increased in live weight at the rate of fully 1 lb. per head per day and were equal to another lot reared on separated milk and crushed oats.

In experiments at the Royal Agricultural Society's farm at Woburn in 1915–16 different lots of calves were reared on crushed oats, palm kernel cake meal, crushed beans, and crushed maize respectively. In the following year crushed oats and palm kernel cake were again tested separately, and, in addition, trials were made with the following three mixtures: crushed oats and beans, crushed oats and palm kernel cake, maize and fish meal. In every case the calves were given whole milk only for the first fortnight, then during the third week changed to the meal and water diet, so that the consumption of milk was very small. The calves were allowed to have a little long hay as soon as they would take it, and at 8 weeks old began to receive a little linseed cake (½ lb.) in addition to the other food. At 5 or 6 weeks old a little hay chaff was mixed with the foods, as it was found that the calves then took their food better. With the exception of the maize, which was scalded, the foods were all given dry. Some difficulty was experienced in getting the calves to eat the palm kernel cake, and it is recommended that it should be given in kibbled form mixed with crushed oats. The amount of concentrated food

given was gradually raised up to 1 lb. or 1¼ lb. per calf per day. The results obtained in the 12–14 weeks' special feeding were as follows :—

	1915–16.		1916–17.	
	Gain per Calf per week. *lb.*	*Cost per lb. Gain in Live weight.* *d.*	*Gain per Calf per week.* *lb.*	*Cost per lb. Gain in Live weight.* *d.*
Crushed oats and separated milk	6·58	4·71	—	—
Crushed oats, with water ..	3·73	2·74	2·75	5·15
Palm kernel cake ,, ..	6·00	1·70	4·71	2·29
Beans ,, ..	4·56	2·14	—	—
Maize ,, ..	4·54	2·98	—	—
Crushed oats and beans, with water	—	—	6·07	2·79
Crushed oats and palm kernel cake, with water	—	—	7·33	2·29
Maize and fish meal, with water	—	—	7·35	2·41

A proprietary calf-meal was also tested each year and gave average weekly gains of 2·85 lb. and 5·32 lb. respectively.

It will be seen from the above table that the best results were obtained with the mixtures, and that of the single foods palm kernel cake gave the best and cheapest results, whilst oats alone proved rather disappointing.

Lawrence has obtained good results with a mixture of linseed cake (3 parts), middlings (1 part), and locust bean meal (1 part); and also with a mixture of palm kernel cake (6 parts), bean meal (4 parts), and locust bean meal (1 part). In each case the amount of the mixture fed ranged up to 2½ or 2¾ lb. per head per day.

There are good reasons for believing that a mixture of foods will generally give better results than any single feeding-stuff, and the experiments quoted make it clear that reasonably good results can be expected from mixtures compounded from linseed, oil-cakes, fish meal, and maize or oats.

Further experiments under the auspices of the Board of Agriculture are at present in progress at Reading, in which the following mixtures are being fed along with whey :—

1. Linseed meal ..	3 parts	4. Linseed meal ..	1 part.
Bean meal ..	3 ,,	Coconut cake meal	1 ,,
Fish meal ..	1 ,,	5. Linseed meal ..	3 ,,
2. Linseed meal ..	3 ,,	Linseed cake meal	2 ,,
Ground oats ..	3 ,,	6. Bean meal ..	5 ,,
Fish meal ..	1 ,,	Linseed cake meal	4 ,,
3. Linseed meal ..	2 ,,		
Fish meal ..	1 ,,		

In each case the meal mixture is fed at the rate of 1 lb. per gal. of whey, a small quantity (½ oz.) of precipitated bone-flour being also added. Actual results are not yet available, but up to the time of writing no trouble has been experienced with any of the mixtures, and the calves have made good progress.

In these days of restricted choice of feeding-stuffs calf-rearing must necessarily proceed largely upon experimental lines, and the nature of the feeding must be determined more by the available feeding-stuffs than by established practice. The results obtained may not be as good as have been customary in the past, but with reasonable care it should be possible to bring the calf satisfactorily through the critical period of rearing until it can maintain an adequate rate of growth on home-grown foods.

(This article is also issued in the form of Food Production Leaflet No. 14, copies of which may be obtained free on application.)

THE MANUFACTURE OF SMALL CHEESE WITH IMPROVISED APPARATUS.

MANY farmers and milk producers who are anxious to make cheese hesitate to make arrangements to do so because they fear that it may not be possible to obtain all the utensils which they consider are required. It is necessary, therefore, to consider how far it is possible to improvise and employ the ordinary utensils which are commonly possessed by the dairy farmer.

There are three articles which the prospective maker must obtain and for which no substitutes are possible. These are a thermometer, rennet, and cheese moulds. Other utensils found in the farm dairy may usually be made to serve the purpose of the cheese maker.

Cheese is usually made in a double-jacketed vat. In this vat the milk is renneted and allowed to coagulate. When coagulation is complete the curd is cut with special knives and heated to the proper temperature by admitting steam or hot water into the outer jacket. When in the right condition as regards acidity and dryness the whey is drawn off through the tap provided and the curd is allowed to acidify in the vat, or it is removed to a curd sink or cooler to complete the process of ripening. At the proper stage the curd is usually ground in a special mill, salted, placed in the cheese moulds and then put to press. Pressure of the cheese is necessary for several reasons. Firstly, it consolidates the curd, making the cheese firm and easily handled. Secondly, it is necessary to press a cheese to prevent the curd draining too much and 1
the cheese hard. It also stops to a great extent th

development of acidity, which, if allowed to continue, would result in a hard, sour cheese having very little food value. Thirdly, it is necessary in order to form a close and impervious coat on a cheese, since mites and the maggots of flies enter and quickly destroy an unpressed cheese.

There are types of cheese which are unpressed, and these are of considerable size. For example, the Stilton is an unpressed cheese, but at the present time it is not advisable to make this class of cheese as it is really a luxury, while a great deal of skill and practice are required to ensure successful manufacture, the process being spread over a long period. The farmer who wishes to make cheese for his own consumption or for sale should elect to make a cheese of the Cheddar, Cheshire, or Derby type. These are best made of mixed morning's and evening's milk, and if the evening's milk is slightly sour, so much the better. A useful size of cheese is one of about 10 or 12 lb. in weight. Of course, almost any size of cheese less than 10 lb. can be made in the same mould or hoop, provided there is a sufficient number of wooden followers or blocks to enable pressure to be exerted on the cheese.

How to Make the Cheese.—A short description of the manufacture of the type of cheese which is most easily made under improvised conditions may be of value to the prospective maker.

As already stated, the cheese selected should be of the Cheddar, Cheshire, or Derby type, these being best made of mixed milks. The evening's milk should be placed in the dairy in ordinary setting pans or creamers and the cream allowed to rise. Next morning the cream should be removed and placed in a separate vessel on one side. All the skimmed milk should be poured into the vessel in which it is intended the cheese shall be made. As the warm milk comes in from the cowshed it should be added by passing it through a strainer along with the cream obtained from the evening's milk. This will mix in the cream and ensure that the whole is an even liquid.

Acidity and "Starters."—By the use of milk from two milkings the maker ensures the presence of a certain amount of acidity which is absolutely necessary if good cheeses are to be made and finished in reasonable time. The scientific cheese-maker uses a "starter" for the purpose of obtaining the required degree of acidity in milk. This starter contains pure cultures of the ferment which produces lactic acid. As, however, there is difficulty in getting suitable starters, and as the postal

rates have of late been raised, it rests with the cheese maker to provide his own starter.

If it is found that the milk works slowly and that there is delay in getting enough acid in the curd, the maker should set on one side a quart or so of freshly-drawn milk in a clean glass jar covered with a clean cloth. This should be allowed to stand in a moderate temperature till it gets sour, and in that condition it can be used as a starter to promote acidification in the milk, at the rate of 1 per cent. or one pint to each hundred pints of milk used. This starter should be strained and added to the bulk of the milk after the latter has been heated to renneting temperature. Generally, however, it is found that if the milk is set and skimmed in the ordinary way, there will be sufficient acidity in the mixed milk to ensure a satisfactory cheese.

The Cheese Vat.—The milk being to hand, the farmer who is without a cheese vat must consider how best to improvise. Any well-tinned vessel of sufficient capacity can be used, but a shallow vessel is better than a deep one.

The feeding or supply tank of a milk cooler or separator answers admirably, since, as it has a tap, the whey is more easily drawn off. An enamelled bath will also serve. A clean wooden tub, such as the body of an end-over-end butter churn, can be used, in which to coagulate the milk, and is excellent if made of oak, as the whey does not penetrate into the pores of the wood. Small quantities of milk are best set up in wooden vessels, as the heat is thus retained for a longer period. Galvanized vessels should not be used, however, as the acid in the whey forms a poisonous compound with the zinc used in the coating process.

Temperature.—The milk being in the setting vessel, the temperature will need to be raised to the proper degree. When making up small quantities of milk the setting temperature should be higher than would be the case with large vats of milk. A temperature of about 86° F. will give good results.

The milk can be heated either by placing a portion of it in a clean pail in a copper of hot water or a pail of hot water can be stood in the milk, the milk being well stirred till the proper temperature is obtained (see Leaflet No. 231 for instructions in heating milk and whey). The milk being raised to the correct temperature, it will be necessary to ascertain if it is sufficiently acid. This is done by adding 1 dram of rennet to 4 oz. of milk at 84° F. in a cup or glass, and stirring in quickly for 10 seconds. If at the end of 20 seconds

the curd "catches," *i.e.*, exhibits a slightly granular form on the finger, then the milk is ready for the rennet. If not, it must be allowed to stand till the maker considers that it is time to add the rennet. In no case should the maker attempt to make cheese from perfectly fresh milk. The use of fresh milk delays the process of cheese-making; it usually results in the production of a cheese of inferior quality and flavour, the cheese does not drain properly, and in the course of a few days such cheeses swell and afterwards leak in the curing room and deteriorate rapidly. If no sour milk is available and the milk is too sweet, then a little fresh clean-flavoured butter-milk can be used with advantage.

Renneting.—Rennet should be used at the rate of one dram to 3 gal. of milk. If no proper measure is at hand then the rennet may be measured out at the rate of 20 drops for each gal. of milk used. One ordinary teaspoonful of rennet extract is sufficient to coagulate 3 gal. of milk. The rennet should be mixed with a little clean water before it is added to the milk, and it should be stirred in briskly for a minute or so after addition, and the milk should be stirred occasionally, on the surface only, for not longer than 10 minutes. This stirring prevents the cream rising and results in a more uniform cheese. When the milk has stood for about 45 minutes it should be ready to cut.

Cutting the Curd.—If, on the insertion of a finger, the curd feels firm and splits clean it is ready for cutting. If no proper cheese knives are available the curd can be cut with a large carving knife or a ham knife. It should be cut into ½-in. squares as gently as possible and then diagonally. It should then be broken up very gently into "cubes" with the hand or with a skimming dish, and the sides of the vessel should be cleaned down. The curd should now remain untouched for 15 minutes or so, and then be stirred gently for a few minutes. The curd at this stage should be of the size of haricot beans, and the whey should be green and not milky.

If the maker wishes to produce a Cheshire type of cheese the temperature of the contents of the cheese vat should gradually be raised to 92° F. If a Cheddar cheese is required then the whole will need to be raised to 100° or 102° F.

If the cheese tub has no water compartment the temperature must be raised by removal of a portion of the whey, heating it in a pail in a copper or other vessel, and returning it to the cheese tub. To get off the whey the proper course to follow is to allow the curd to settle for a few minutes

and then to insert a cheese cloth. This cloth is spread over the vat and depressed till it reaches the curd and a pool of whey has collected. The cloth is used to separate the curd from the whey, so that some of the whey can be ladled out into a pail. This should be heated to not more than 130° F. and be returned to the tub. The curd should be stirred by hand for 10 minutes or so. This should be repeated at intervals of a few minutes until the whole contents of the vat or tub are at the required temperature. For a Cheshire cheese the ultimate temperature should be 92° F. For a Cheddar it should be about 102° F.

If it is desired to make a Cheshire cheese, stirring is continued until the curd particles are distinct, but soft. For a Cheddar stirring is continued until the curd particles are hard and distinct, with a tendency to "mat" or run together. This tightening up of the curd is due to the development of acidity.

Drawing Off the Whey.—When the curd is distinctly acid the whey should be removed. The curd should be allowed to settle and then the whey should be drawn off through the tap, or, if there is no tap, after the curd has settled the whey may be ladled or poured off through a strainer. In the latter case the curd should be put into a cheese cloth and tied up fairly tight. It should then be placed on a sieve or rack in the bottom of the cheese tub so that the whey can drain away. In no case should the curd be allowed to lie in the whey which has drained from it. If this is permitted the resultant cheese will be soapy and weak. In whichever way the curd is drained and ripened it should be opened out occasionally and cut into 4-in. cubes. This assists drainage and the development of acidity. From the time the whey is drawn the curd should be kept warm until it is ready for grinding. If the milk has been ripe the whole process should not occupy more than 5 hours and except during the heating process attention is only necessary at intervals.

Grinding the Curd.—Grinding or breaking up the curd follows when the curd is sufficiently sour or "ripe." To ascertain if the curd is ready to grind an old reaper file may be heated to a black heat. A little of the curd should then be pressed in the hand until it is solid and dry. This should be brought into contact with the heated file, and be drawn gently away. The curd will string out in fine hairs. If these are ¼ in. long before breaking, and the variety of cheese being made is of the Cheshire type, then the curd is ready to be broken up and salted.

For a Cheddar the strings should be 1 in. long before the curd is ground. A curd mill can be dispensed with if the quantity of curd does not exceed 20 or 30 lb.

The Cheshire curd, being soft, is easily broken up by hand. It should be broken up rather fine—about the size of split beans. Cheddar curd is more difficult to break. The curd should be first cut into strips with a sharp knife, and then broken up into pieces about the size of half a walnut. After breaking it should be well stirred and allowed to cool a little, after which the salt may be added. It is not necessary to weigh the curd

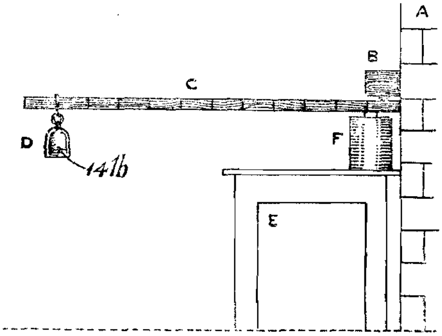
Salting.—Salt should be added at the rate of 1 oz. to every 3 gal. of milk used. For example, if 12 gal. of milk are being made into cheese then 4 oz. of salt will be required. The salt should be stirred in carefully and the curd should remain until it loses its harsh condition or becomes velvety.

Moulding.—It will now be necessary to place the curd in the cheese hoop or mould. A cheese mould large enough to make a 10-lb. cheese should be 7 in. wide and 10 in. deep. The finished cheese will not be of this size, but allowance must be made for the new curd, which is open and bulky. Most makers use a special kind of cloth to line the cheese mould, but this can be dispensed with.

What is generally known as a grey cotton cloth answers the purpose quite well. This is cheap and easily obtainable, and can be used in place of linen cheese cloth.

Pressing.—The final process in the actual manufacture is the pressing of the cheese. If a Cheshire is being made the pressing should not take place till the morning following the date of manufacture, the cheese, meanwhile, being kept warm. This allows the sweet Cheshire curd to ripen somewhat, and results in a cheese having an open texture. If a Cheddar cheese is being made then pressure should be applied a few minutes after the curd has been placed in the mould. Pressure is applied in a variety of ways. The old way was to hoist a big stone or box of bricks by means of a rope and pulley and place the cheese under this. This method, however, is slow and cumbersome. Modern presses are of three types, viz., spring presses, a combination of the screw and spring, and screw and double lever presses. All, however, are expensive and difficult to obtain at the present time. Fortunately, it is not difficult to improvise a press from materials usually found on the farm. A bar of wood 6 ft. long and about 2 in. square section should be marked out by

notches at intervals of exactly 6 in. This bar can then be used as a lever with which to press the cheese. The other items necessary are a block of wood which should be nailed to the wall and a 14-lb. weight or a couple of bricks. Pressure is applied as shown in the sketch.



A—Wall ; B—Block of wood fixed on wall ; C—Wooden lever, 6 ft. long and 2 in. by 2 in. section ; D—Weight ; E—Kitchen table ; F—Cheese mould containing cheese.

The block B should be placed in such a position that the bottom of the wooden lever C is ½ in. above the level of the cheese mould F. If cheese moulds or hoops are of different sizes they can be raised to the required position. When placing the mould in position the circular wooden follower with the square pressing block on top which goes in the mould should stand clear above the upper rim of the mould. On the top of the upper follower or block should be placed a small piece of iron rod, ½ in. square section, of such a length that it goes easily into the mould. This rod should be placed exactly across the centre of the mould at right angles to the lever bar. This will ensure continuous and equally distributed pressure.

As the cheese sinks one or two thin pieces of wood should be placed under the top follower so that the lever is kept as nearly as possible in a *horizontal* position. If the bar rests on the mould itself then no pressure is being applied to the cheese. The cheese mould should be placed in some vessel such as a setting pan or shallow wooden tub to prevent the whey spreading over the table and floor.

When first put to press the cheese should be placed under the third mark from the wall. Later it should be moved to the second mark, and finally pressed under the first mark nearest the wall, or 6 in. from the wall end of the bar. The greatest pressure is exerted when the weight is at the extreme end of the lever.

An improvised press as described will exert a maximum pressure of about $1\frac{3}{4}$ cwt. with the weight at the extreme end and the mould under the first mark from the wall. With the mould in the first position and an unweighted lever the pressure on the cheese will be about 28 lb. If the weight is placed on the second mark on the bar or lever the pressure exerted is about 56 lb. and at each mark to the right the pressure will be increased by about 14 lb. If more pressure is needed in the final stages this can be obtained by placing a brick or other weight on the end of the lever. A final pressure of 2 cwt. is found to be quite ample for a cheese of 10 or 12 lb. weight, especially if the curd has been properly ripened or soured before being placed in the mould. It is important to keep the lever in a horizontal position. A lever down at one end makes a crooked cheese, and pressure is unequally distributed. The morning following the date of manufacture the cheese should be taken out of the mould, turned and replaced with a dry cloth. Twenty-four hours is usually sufficient time for the cheese to remain in press. When taken from the press the cheese should be dipped in hot water for a minute and then be bandaged.

Bandaging.—Any light cotton cloth may serve as a bandage. The bandage is best made and put on in a tubular form. A piece of cloth should be stitched so that it can be drawn tightly over the cheese. If turned inside out before it is placed in position it will be neat in appearance when on the cheese. The cloth should be 2 in. larger than the cheese, and the inch overlap at each end of the cheese should be pasted down. If a little common fat or unsalted whey butter is obtainable the cheese should be rubbed with this before bandaging.

Curing the Cheese.—The next matter is the curing of the cheese. Any room having a moderate and regular temperature is suitable. The floor of an unused bedroom will suffice, or a dry cellar. If the room is too damp there will be growth of mould on the surface of the cheese; if too dry then the cheeses will crack. Care must be taken that no mice have access to the room when the cheeses are being cured.

A cheese made on the foregoing lines should keep for 6 months, especially if it be of the Cheddar variety.

Note.—Skilful management at three important stages in the process of cheese-making is essential to success. (1) In the first stage the milk should be sufficiently ripe or acid before rennet is added. If too sweet or too sour the results will not be satisfactory. (2) The second important stage is at the draining off of the whey. At this stage the acidity of the curd should be distinctly discernible; if too sweet then the whey will not drain away when the cheese is put to press, and the resultant cheese will be soft and spongy, have a weak and bad flavour, and will putrify rapidly. (3) The third important stage, especially when Cheddar is being made, is at the period when the curd is broken up and salted. If the curd is salted in too sweet a condition then the cheese will be soft and weak in flavour; if too sour the ripened cheese will be hard and dry.

If reasonable attention is paid to these points and care is exercised at the other stages of manufacture, the cheese should turn out well, and be a valuable addition to the winter's food supply.

THE AGRICULTURAL PROGRAMME OF THE UNITED STATES.

THE national steps which have been taken and many individual or local efforts that have been made to increase production in this country should be well known to readers of this *Journal*. It may be useful, however, and an encouragement to British workers, to know what has occurred in the United States. It is therefore proposed to quote the following passages from the February (1918) issue of the *Experiment Station Record*, published by the United States Department of Agriculture:—

"For the first time in history the United States, along with several others of the allied countries, has drawn up a working program for agriculture, to secure adequate production. This is one of the many unusual features growing out of war conditions, and particularly of our relations and responsibilities to the allied countries. The new memorandum, issued by the Department of Agriculture in February,*

supplements the one published in August of last year relating mainly to cereals."

"Like most of the measures in this country pertaining to food production, this is not a prescribed program but comes in the form of a carefully-weighed suggestion as to the needs and means of meeting them. It is voluntary, of course, but it is hoped that it may serve to give general direction to the season's campaign and stimulate efforts in the lines in which they are most desirable. Its appeal rests primarily on the necessity of the situation, and the understanding of agriculture's part in the great War."

"In a word, the outline is 'a statement of conclusions concerning the agricultural situation and the planting needs. . . It is offered as a recommendation for those engaged in crop and animal production, especially for the many farmers who are in *a position to readjust their agricultural program in* accordance with the national necessities.' In the main it is general rather than specific, except for wheat, and it is considerate of farming conditions and specialized branches. It is in no sense an office program made up on statistical and theoretical considerations, but it embodies the judgment and suggestions of agricultural leaders throughout the country. The needs and the possibilities have been viewed in the light of the conditions which prevail at this time. It is designed, therefore, as both practical and practicable, barring untoward developments of the season. It is therefore something to work to, and to join hands in seeking to attain."

"While the situation is such that chief emphasis is laid on the production of the great staple food products, with special stress on wheat and hogs, the outline summarizes the aims for securing sufficient cereals of various kinds, meat and dairy products, sugar, cotton, and other products for the Nation, its armies and its Allies. It will furnish the basis for personal appeal and guidance throughout the country, but it differs radically from the programs of some of the European countries in its lack of provision for enforcement or regulation of the industry, such as is now common there. For agriculture in the War has assumed the character of a military necessity in those countries, and although not brought directly under military control it is dominated to a large degree by its requirements and subjected to civil orders and regulations hardly less mandatory."

"The increasing extent to which these measures have been put into effect in Europe, especially in the past year, shows by

comparison the relative freedom which prevails here, and the absence of many of the real handicaps and hardships which have to be met in other countries. Here dependence is placed on individual response and the determination to resist failure, while there regulation and compulsion have been resorted to in a thousand ways new to modern times and stimulation and direct aid have become the order of the day. A knowledge of the conditions and measures relating to agriculture in the War is of no small interest in this country, since food production has become one of the great co-operative enterprises between us and our Allies."

"The efforts made in respect to European agriculture are well illustrated in Great Britain, since that country has been peculiarly dependent on outside food supplies. . . ."

And finally, after giving an account of the farmer's difficulties in this country, and of the steps which have been taken to increase food production :—

"Evidently determination is nowhere more pronounced than in relation to agriculture. Its prosecution has become a war measure of highest importance, and the country is straining every nerve and resource to meet the necessity as now clearly seen."

"These high purposes and splendid efforts command admiration. The determination to rise above the handicaps and difficulties which surround the industry furnishes an evidence of what may be accomplished under co-operation and effective leadership. Time-honoured customs and long-established systems have been swept aside, in a country proverbially conservative and among a class slow to make radical change."

"The British farmer has had to meet harsh criticism and charges from sources unreasoning and uninformed as to the real situation and its difficulties. These have been an added burden, but the British Premier, himself born on the land, has urged the farmer to think only of one thing—his country's need, and has confidently predicted that this will enable him to win a great triumph for British agriculture and for the Empire."

"Such an example ought to prove an inspiration to us in this country, where the aims are similar and the obstacles less pronounced. We have reached the stage for adjustment in many matters and the necessity for a larger measure of co-operation in realising the desired result. The employment of every resource is necessary. To help in this accomplishment

is the opportunity of the colleges, the stations, and the vast army of agricultural extension throughout the land."

British agriculturists should be happy to feel that their American Allies in the prosecution of the great War of Liberty are able to write thus of them and their efforts, and they will certainly wish to have expressed on their behalf the high sense of gratitude and admiration they in their turn feel for the energetic, practical and unselfish action taken by America, not alone in her military prosecution of the War, but in ensuring that the food needs of her European Allies shall be fully met.

The following is a summary of the main items included in the programme of the United States for Agricultural Production for 1918 (U.S. Dept. of Agric., Office of the Secretary, Circ. 103, 19th February, 1918), referred to in the above note :—

It is pointed out by the Department of Agriculture that in spite of the large production in many directions during 1917, the situation is not satisfactory. Chief emphasis is given to the production of the great staple food products, with special stress on wheat and pigs, the leading war foods.

Spring Wheat.—An earnest appeal is made to increase the acreage under spring wheat in order that an adequate supply of wheat, both for home use and to meet the needs of the Allies, will be assured. To this end the crop is being re-established in certain parts of the country where spring wheat has not been grown in recent years. It is believed that to a small extent the acreage in oats, if necessary, could be reduced in the interest of wheat, even though this may somewhat reduce the oats for feeding to live stock, leaving the animals more dependent upon other grains and roughage. In some cases, where the acreage of spring wheat proposed cannot be planted, it is suggested that the acreage of barley might be increased, as barley is now in greater use in the United States, besides being a welcome food in Europe. Farmers are asked to give special attention to the thorough preparation of the seed bed, the selection of the best seed obtainable, and the treatment of seed where necessary to protect it against disease, in order that the maximum results may be obtained.

*Corn.**—In view of the large acreage under corn in 1917—the largest on record—no increased acreage is asked for, and slight reductions may even be made in certain sections where such reductions would free areas for spring wheat, and so benefit food production as a whole.

Pigs.—As a result of a very careful study of the pork situation it is desired during 1918 to increase the number of pigs kept by at least 15 per cent. This question has become more acute owing to the large and continued decrease in the number of pigs in the Allied countries, and also to the general shortage of fats, especially lard. Among the methods suggested for an increased production of pork are breeding for two litters a year, saving through better care a large number of the pigs farrowed, growing pasture and forage crops, using wastes, especially

* This term in America refers t[illegible]

town and city garbage, proper rations of concentrated foods, and finishing pigs to heavier weights up to about 275 lb.

Beef Animals.—Owing to the depletion of the European supply of cattle in consequence of the War an increased demand will be placed upon the American market, and a general increase in beef production is therefore appealed for. It is interesting to note that the exports of dressed beef and beef products have increased 177 per cent. during the past three years.

Potatoes.—The cultivation of potatoes is being encouraged, and the home consumption of this article of diet on a more extensive scale is advocated in order to release more wheat for export.

Dairy Products.—There is a need for increased supplies both for home use and for export, and this need can best be met by a fuller utilisation of the by-products of milk, more especially skimmed milk and buttermilk.

Poultry.—An appeal is made for a large increase in poultry production, especially in back yards and on farms where waste material is available and the purchase of expensive feeding material is not required.

Sugar.—An extensive increase in 1918 is not possible, largely owing to the limited amount of seed available, and suggestions are therefore made with the object of securing the largest acreage and obtaining the highest yield from the seed available.

THE TAKING OF WILD RABBITS.*

PART I.

R. SHARPE.

Damage Done by Rabbits.—No man knows better than I do the damage of which rabbits are capable when conditions permit; but a proper system of management should obviate the necessity to discuss extermination. The system which I term "proper management" may be applied to either purpose—namely, to rabbit preservation within determined limits or to outright extermination. When control has enabled the alternative policies to be compared, whichever policy is found to be the better, should be adopted. There are very many places in the British Isles where rabbits may be encouraged without the risk of damage, provided always that an intelligently conceived and properly executed system of management is adopted. Even in situations not on the face of things suitable for rabbits a valuable crop may be gathered without injury to more important interests. My own experience supplies a case in point.

For a number of years I hired the Stoughton Manor shooting in Hampshire. The area was some 2,000 acres, consisting of covert, farm land, and downs carrying juniper bushes, gorse, and other cover favoured by rabbits. Clearly, in my situation of shooting tenant I could enjoy none of the privileges of a ground landlord in the way of securing special favours for sport. My profits were not only derived from the produce of my pheasantries, but I also sub-let the shooting on the basis of so much per gun. Rabbits, as all know, are a great asset on a small shoot of the kind which is expected to provide sport for week-end visits throughout the season. We killed thousands of rabbits every year, but never during the whole of my tenancy was a single claim lodged for damage done to the underwood in the coverts, the responsibility resting on my shoulders. I kept all the cornfields properly netted—in fact, there was a permanent wire fence all the way between the downs and the cultivated land. When a stretch of underwood was cut I invariably enclosed it for the first year, after which it was safe, the netting being then available for moving to the next piece. I always took steps to kill off the bulk of the rabbits in the coverts not later than the end of November. This prevented the gnawing of the hazel and its consequent destruction. Shooting did not suffer, for I always left till last the rabbits which were least likely to do damage. By judicious management I could always show a decent day's sport right up to the end of the season. In proof of this assertion I might mention that some old accounts I recently looked up showed receipts for rabbits sold in the month of January to have been £87 odd.

The fatal mistake which is nearly always associated with damage by rabbits is the leaving of large stocks in the coverts during the hard weather. In such circumstances they are bound to do serious damage. Those of my rabbits which had been allowed to remain on the downs were fed at such times by the cutting down of juniper and gorse bushes. These, when strewn on the ground, provided ample food, so removing the temptation to wander. Rabbits must get hard food from somewhere during periods of frost and snow, and if they cannot find it in their regular haunts they move to places where it can be obtained. Those who complain of the destructive habits of the rabbit should always ask themselves what harm rabbits can possibly do in December if the stock has been steadily killed off during the months of September, October, and November till nothing but the barest breeding stock rer

Definition of Good Management.—The prime essential of sound management is that rabbits shall be killed off early. What happens at present in a large number of places is that thousands are about at a time of year long after the proper season for killing them. They soon deteriorate in food value, for when the month of March opens breeding operations commence. Operations should commence towards the end of August, though admittedly this date is full early. Consignments must be sent daily to the dealer, and even then it is difficult to prevent fly-blows. The kind of weather experienced must influence the action taken. Snares set in the early stages of the season must be placed well away from the covert or hedgerow from which the rabbits emerge; this because very small rabbits seldom travel so far from home as do the more mature ones. Snares set well out are also less likely to be knocked over by the youngsters, which oftentimes jump right through the loop without being caught.

Traps Unsuited for Early Operations.—Traps are quite inadmissible for early operations, because, being set in the holes, they catch a preponderance of young rabbits. These, as all know, are the first to come out. The older ones which follow later not only escape for the time being, but they betake themselves elsewhere to escape the danger so prominently brought to their notice. Covert being at this season plentiful they experience no difficulty in finding fresh accommodation. For the reason stated, the trap should not be brought into use until November. The desire for extermination supplies the only justification for exceptions to this rule. Snaring can, of course, be done all the year round. Less practice is required to become a good snarer than a good trapper. This applies particularly to the rate of working. There are many who object altogether, on humanitarian grounds, to the use of the trap, but the very legitimate objections lodged against trapping are traceable to errors of method rather than to inherent defects in the system. A similar remark applies to the objections lodged on behalf of the fox-hunting interest. The law directs that traps shall be laid inside the burrows, but there are many who actively object to the trouble involved in obeying the law.

Scarcity of Skilled Trappers.—The *personnel* available to carry out the necessary programme is growing scarcer every year, not merely as a result of the War but as part of a process which has been at work for a much longer period. If r—

ture is to be set upon a proper footing, the auxiliary work of managing rabbits and keeping down vermin must not be neglected. Many causes have been at work during recent years to diminish the supply of competent trappers. One of them has been the increasing cheapness of guns and cartridges, and the consequent development of shooting rabbits bolted with the aid of ferrets. Another explanation is the modern craze for huge bags of pheasants. The younger generation of keeper has graduated in the pheasant field, his tuition having in the majority of instances begun and ended with pheasants. No more fatal mistake could possibly be made, for even pheasants are useless if turned out into woods swarming with vermin of every description. The prime essential in a keeper is that he shall be a first-class trapper. Rabbit trapping is but one branch of the art, but if rabbits are deemed worthy of attention as a source of food supply, justifying cultivation, then trapping must extend its functions in the direction of removing the enemies of the rabbit, which are also the enemies of the farmer.

The keeper of the future may, perhaps, be recognised as the faithful servant of agriculture. In the past his services in that direction have only been appreciated by the more discerning. Perhaps some day his duties and responsibilities may be so enlarged as to raise the status of his profession in accordance with the services he is so well fitted to perform. Meanwhile, the sons of keepers find few incentives to follow their father's calling, whilst those who have attained responsible positions have too often left out the most important department of their training. One of the reasons why trapping has so largely become a lost art is that the use of traps is discouraged in coverts on account of the disturbance their use occasions. There is no reason why trapped rabbits should scream and otherwise cause the agitation which is held quite rightly to breed nervousness in the sanctuary of the pheasants. But as the use of the lamp at night cannot altogether be dispensed with when dealing with rabbits the snare applied in the open is to be preferred. Trapping is vital, but a knowledge of details is necessary to avoid the mistakes of application which so frequently result either in unqualified prohibition or in half-hearted employment.

SNARING OF RABBITS.—General Principles.—To obtain success in the snaring of rabbits a certain number of rules must be rigidly observed. To the novice many of these may appear immaterial, but experience has proved that they cannot be disregarded. For the most part they are based on the acute

sense of smell possessed by the rabbit. The time of day for setting the snares, the practices to avoid whilst setting them, and the sundry adjustments to weather conditions are all related in the end to this highly specialised gift. Beginners are inclined to scoff at the idea, but until they recognise its undoubted truth they will never attain success. Let anybody try to drive rabbits against the wind towards a line of guns, or try to stalk one of these animals down wind, and a valuable object lesson will be gained. Other rules of procedure are based on the instinct possessed by all animals of inoffensive habit which have survived and multiplied in a wild state. The snare must be skilfully concealed; its position must be constantly changed in order that familiarity may not cause the rabbits to avoid it.

Time of Day for Laying Snares.—All snares should be laid before the mid-day meal, a sufficient interval being so given for the smell left by the hands to disperse. If, before starting to set the snares, the hands are plunged in damp soil and well rubbed, so much the better. The wearing of gloves is not recommended. Those unused to them perspire freely under the covering, the result being that a well-used pair of gloves leaves more scent on the things touched than do the bare hands. The scent left on the hands by smoking or by contact with a pipe is readily communicated to the snares, and the pungent odour remains on them for a long time. The snarer must, therefore, forego his smoke until all his wires are down. The first rule as to laying snares is thus based upon the keen sense of smell possessed by rabbits.

Set Snares with Reference to Wind Direction.—In selecting a site for operations the snarer should choose a field or piece of land over which the wind is blowing from the home of the rabbits towards the snares. Not only will a rabbit travel down wind at a far greater pace than up, but it will continue travelling freely till enmeshed in the snare, unwarned by the escaping odours which travel the other way. If a rabbit is not travelling fairly fast it does not get caught, for a slow pace enables it to detect any obstacles set in its path. If a down-wind is not available, then try for a side-wind, which comes next in point of desirability, though it is not nearly as favourable as the first-named. The most suitable night for a good kill is one which is not too dark, with a gentle breeze and light clouds scudding across the moon. There is always a chance of the wind shifting after the snares are set, but this cannot be provided against.

Quick Laying of Snares very Important.—Much of the advice here given is directed to the promotion of great speed in setting snares. With all advance arrangements well made a man who has become fairly proficient at the business can lay from 75 to 120 snares in the hour. The higher speeds can only be reached on fairly good setting ground, with runs frequent and the earth receiving the pegs in a docile spirit. On bad pegging ground, or where there are a few rabbits about, the total of snares set in a given time is much lower.

Drive all Pegs with a Mallet.—When only a small amount of snaring is done the pegs are usually driven home with a stamp of the heel, but this practice is not one that can be generally recommended. Balancing on one leg whilst using the other as a hammer disturbs the grass unduly; the peg is not so cleanly driven and is more likely to come away if the rabbit struggles; finally, the boot is soon injured by performing this unaccustomed duty. The writer prefers, and has always used, a small but heavy mallet with a boxwood head, or a hammer of his own design, having a broad head, and a spike at the other end for opening hard ground for the insertion of the pricker.

Height of Snare above Ground.—As a general rule the loop of the snare should be fixed about $4\frac{1}{2}$ in. above the ground. If the herbage is very short 4 in. is high enough, but if the grass is extra long the height of the wire may be increased to $5\frac{1}{2}$ in., or, in extreme cases, 6 in. A good deal of discretion must be used at all times, and note must be taken of the fact that rabbits leap higher if the grass is wet as a result of dew or rain. The wire should be placed centrally above the run, but as the pricker must never obstruct the line of traffic the loop must be set slightly aslant.

How to Fix the Pricker.—The pricker must be planted firmly in the ground about $1\frac{1}{2}$ in. to one side of the run, but slanting slightly inwards so as to hold the wire in the right position without introducing the necessity for bending. Many rabbits are lost by the pricker giving way at the first pull on the snare wire. At this critical moment it should hold fast, because by so doing it enables the noose to draw up quickly. If the pricker gives way the extra slack provided delays the tightening of the snare and affords the rabbit an opportunity to back out of the wire and so escape. Not only is such a rabbit lost, but it has learnt a lesson which will lessen the chance of its capture by the same method in the future. Prickers which lie too close to the run are liable to be kicked by the hind foot of the rabbit in the

act of landing on all fours. A pricker set well to one side and firmly planted thus escapes or resists disturbances at the critical moment when the rabbit is due to leap into the snare

How a Rabbit Jumps.—The necessity emphasised in the previous note of planting the pricker firmly and to one side of the run will be made apparent by devoting a paragraph to the action of the rabbit in running. Nineteen persons out of twenty wrongly interpret the characteristic foot-marks of the rabbit as imprinted on snow. They correctly diagnose the pair of side prints as those of the hind feet and the two centrally disposed, one in advance of the other, as made by the fore feet. Where they go wrong is in thinking that the direction of travel is with the front feet foremost, whereas the hind feet are planted on the ground well in front of the fore feet. In other words, the rabbit is travelling in the opposite direction to that which appears at first sight to be the case. As the hind feet can only reach the front position by leaving a central gap free to accommodate the fore feet, their wide separation is explained, also the fact is made clear that if one of the hind feet kicks the pricker it does so whilst the rabbit's head and body are still well to the rear.

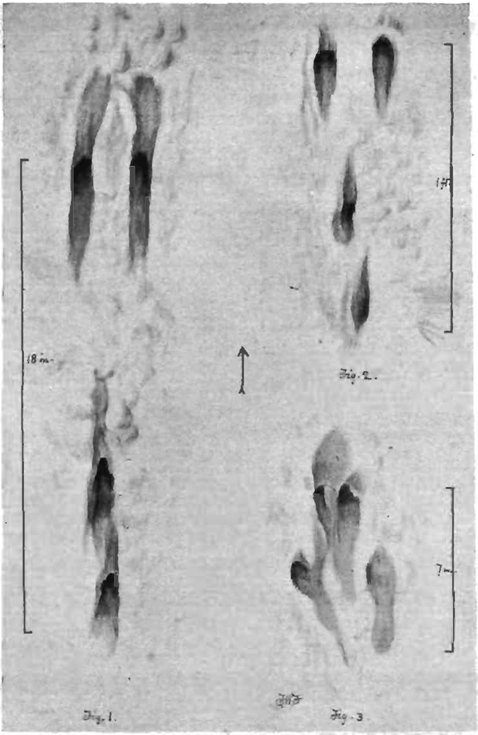
The studies of rabbit tracks shown in Fig. 1 have been made by Mr. Frohawk for the purpose of explaining the distinction between the long and the short beats. The arrow denotes the direction of travel, and the measurements at the side show how the distance between the hind-foot tracks of the rabbit and of the fore-foot tracks varies with the speed. The 18-in. separation shown in Fig. 1 is achieved at full gallop, the fore feet no doubt striking the ground whilst the body carries forward under the power of momentum, the hind feet striking the ground later. The one-foot separation, as shown in Fig. 2, represents the ordinary rate of progress along runs, the hind-feet tracks being still in front, although the two pairs of feet would be likely to strike the ground more nearly simultaneously. Fig. 3 denotes the sitting position. A rabbit run consists of a series of beats or jumping places at more or less regular intervals, the variation in their spacing depending on the degree of flatness of the ground and other causes. The long beats are the longer of those beaten-down places, denoting that the rabbit frequently jumps from one to the other with one or other of the wider degrees of separation between front and hind feet contacts with the ground. As rabbits use the same beats whichever way they are running, the long beat is well defined. Short beats occur promiscuously in runs, perhaps at intervals separated by a series of five or six long beats. Snares should always be set in the long beat.

Set Snares in the Long Beat of the Rabbits' Run.—Full appreciation of the facts stated above is necessary in order to distinguish the long from the short beats in a rabbit run, and so be sure of setting the snare in the long beat. A snare so set is equally successful in catching the rabbit when travelling on the outward or on the return journey. The snare should be set in the middle of one of the extra-beaten places. Then, from whichever direction the rabbit arrives, its chest nearly touches the bottom part of the snare and its head is practically through the loop. If it does not scent danger the next bound draws the

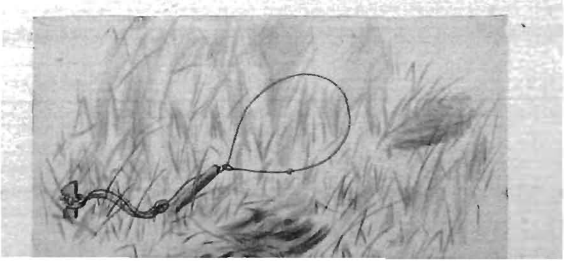
loop tight round its neck. Occasionally a rabbit will be caught round the shoulders, with one or even both legs in the loop. Either signifies that the snare has been set too low. Should the loop fasten round the loins of the rabbit only a firmly-planted peg and sound tackle will retain it. Snares set in the short beats get knocked down as the rabbit in its leap passes over the top. The same will often happen in the case of correctly-set snares, but this mishap is nearly always caused by one of two things—rabbits chasing one another or fleeing from danger, real or supposed. Under the last-named conditions the regular beats are not used, long leaps being taken which leave as many as three or four of the intermediate ones unused. Chance then decides whether the snare is located at the beat used or whether it is brushed aside by contact with the rabbit's hind feet in the course of its jump. Correctly-placed snares command success in the majority of cases.

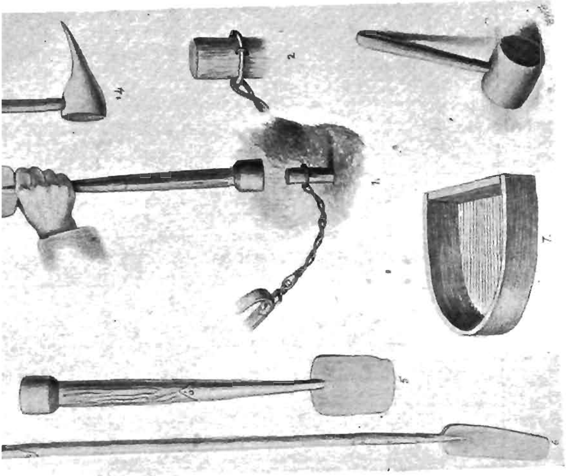
Never Kneel on the Ground.—A rule to be observed without exception is to avoid kneeling on the ground when setting a snare. The practice of kneeling tends to "foil" the ground close to the snare, and, as previous notes have made clear, the snare is set at the points in the run where the animal lands on its hind feet and braces its muscles for the next leap. An interval of time, depending on the rate of travel is devoted to these processes and, although short by measurement, it represents momentary stillness compared with the rate of movement during actual leaps. If the rabbit scents danger at these moments the pause is prolonged for observation purposes.

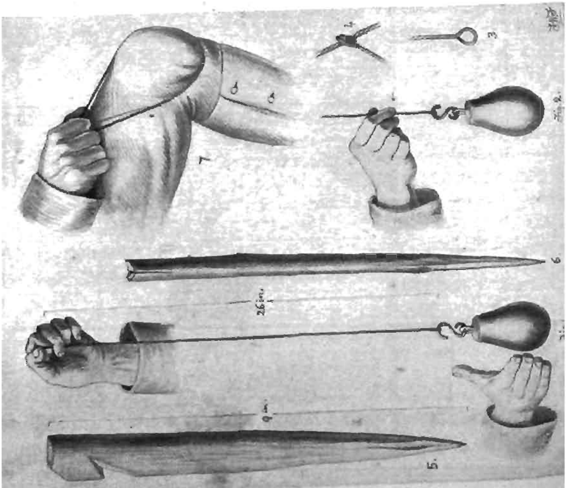
The Real Secret of Success.—The real secret of successful snaring is to remove the wires to fresh ground after they have been in use for one night. Their next place of setting should be situated up to half-a-mile from the first, the main consideration being the certainty that operations shall be conducted against a fresh lot of rabbits. Many snarers who agree with the general principle embodied in this advice affirm that the snares may well be left in the same place for a second night. They support their argument by the quite accurate assertion that fully half the first night's catch can be looked for on the second occasion. With this I agree as far as the first time over the ground in early autumn is concerned. But the penalty is paid on the occasion of the second time over, and the evil results are at a maximum if several nights of continuous snaring have been indulged in. What happens is akin to the case of a man who is cutting across a lawn and suddenly trips over a



Rabbit's Footprints in Snow, 17th December, 1917.
FIG. 1.—Showing prints when running at full speed. FIG. 2.—Ordinary rate of progress along runs. FIG. 3.—Sitting.







hoop which has been laid down to discourage such short cuts. Though few will afterwards go the long way round, they never get caught a second time. Snares which are left for long in one place become familiar obstructions; rabbits get to know them quite well and soon learn to jump over them. The habit is extended to all other snares wherever set. A man working 100 snares on the one-night system will kill more rabbits than he who works with 300 and leaves them for a series of nights on the same piece of ground.

Rabbits Temporarily Desert Ground Continuously Snared and Trapped.—I know of nothing which will drive rabbits away more effectively than snaring continually on the same area. This is not due to the number caught but to the state of nerves induced by the screaming of the occasional rabbit which falls a victim. Rabbits terrorised in this manner desert the ground for the time being and take up their abode in all sorts of unlikely places, to return in due course to their breeding haunts and wreak damage on the farmer's crops. When catching is the end in view scaring as an involuntary substitute is surely bad business.

Number of Snares that Can be Properly Attended to.—A man working single-handed should not be expected to work more than 200 snares at a time, and this only on good ground. In favourable circumstances a skilled man can easily attend to this number, moving them by noon each day to the selected new ground. He must devote his whole attention to the work, and must have available an ample space of ground. On a farm which is not very big, or on extensive farm lands where the proportion of rabbit ground is limited, a smaller number of snares would be used, this principally because too large a total would complete the rotation too quickly. In some of these cases it would pay best to set the full total of snares and to give the land a rest after completing the round. Where the full allowance of snares would cover the whole ground available at one sitting they should be taken up in the morning and be set aside for a clear week.

Night Visiting of Snares.—An important advantage of the one-night or intensive system of snaring is that the snares, having been set over a limited area and so recently that their position is well remembered, can be visited at night. Such visits should be paid not later than 7 p.m., the object being to remove all rabbits which have been caught. On very dark nights a bull's-eye lamp should be carried, but its use should be avoided whenever possible. Exceptional conditions may necessitate

a variation of the hour at which the night visit is paid. For instance, should it be raining hard up to six or seven o'clock and then suddenly clear up, the rabbits which have been confined in their burrows up to that time will want to come out and make up for lost time. A visit paid at the fixed hour will in such circumstances not only be fruitless, but will destroy the prospect of an excellent catch. Hunger will cause the rabbits to leave the covert much more freely than on ordinary occasions, and, as has already been explained, the faster they travel, within reason, the more certain they are to be caught. An interval of from one to one-and-a-half hours should accordingly be left from the clearing of the weather to permit full use to be made of such exceptional opportunities when they arise.

The Evening Visit Discourages Foxes.—Foxes are a great source of loss on ground where rabbits are snared on the continuous system. The large number of wires laid, the considerable area covered, and the relatively small proportion of catches operate together to discourage night visits. When the one-night system is practised the result fully repays the evening visit. The caught rabbits are at once dealt with, and they are not left on the ground to attract foxes by their cries. Not only is this particular invitation to foxes removed, but the passage of a man over the ground discourages visits from foxes during the remainder of the night. If the duty of nightly visits to the snares is faithfully performed, foxes are less likely to develop the habit which, once acquired, means considerable loss and inconvenience.

Influence of the Moon on Snaring.—When the moon is at its brightest, say, from the ninth to the eighteenth day, it will be found that rabbits are not caught with the usual freedom. This is especially the case on bare grass lands. The explanation is, of course, the greater visibility of the snares. During such periods setting should be carried out on ground provided with sufficient herbage to cover the pricker. Stubble fields or land carrying short heather and rushes are cases in point.

General Programme of Working.—To keep rabbits under proper control it is necessary to snare with all possible energy until the stock on the ground has been reduced to the desired limits. The main consideration is the gathering with all possible speed of the rabbits marked out for the purpose. Delay spells loss of rabbits, injury to crops and plantations, deterioration of condition, and a host of other evils The methods by which prompt and early catching are attained are at once the most humane and the most profitable. By snaring each piece of ground on the one-night system, with suitable intervals between the successive operations, the routine adopted on each occasion may be adjusted to fit the stage reached. The order of working which suits the first stage is unfitted for the second, and so on down the series. Finally, when the third or fourth visit proves that the work has been properly done, ample time remains for

conducting those other clearing-up processes upon the success of which so much depends. There are few who realise the importance of commencing to take rabbits early in the season, as soon in fact as they are fit for market. The rabbits may then be reduced to proper proportions by the end of February. When that is done stocks may be reduced to an abnormally low level without diminishing the following season's production. The explanation is simple. If, through bad management, snaring operations are continued all through March the commencement of breeding is held back until well into April; but if the rabbits are left alone after the end of February early litters are the rule and a clear month is gained. The progeny of these early litters will themselves bring up two or three families in the late summer and early autumn. Thus all aspects of the situation dovetail into the scheme of management here recommended. The underlying policy is to produce a maximum crop of rabbits during the season of plenty and to harvest it before scarcity engenders destructive habits.

Placing the Snares for the First Time.—When setting snares for the first time in the season I choose a line about 25 yd. away from the covert or fence containing burrows, and I put snares into all the short runs as well as the main runs. If the rabbits are very numerous I put two snares and at times even three into the main runs at about 15 yd. apart.

Second and Subsequent Times Over the Ground.—For the second set I take a line beyond the first, say, 60 yd. further out, always providing that the runs show this far out into the field. On the occasion of the third attack I ring the changes on Master Bunny and set the snares closer in to the covert, always avoiding, if possible, the exact line of any previous set. The longer the ground is rested the better the results will be; but if all the available ground has been gone over once in the course of a week the interval so provided justifies returning to the original spot and taking the remainder in due order. Not less than 10 days' interval should be allowed between the second and third sittings. As the number of rabbits decreases so the number of runs diminishes, as also does their "brightness." On the third and fourth times over only half the number of snares previously utilised will be found necessary. When dealing with the ground for the fourth time the snares should be set in a more haphazard way—that is, not in any particular line. Some may be set quite close to the covert in the brightest of the runs, others can be put far out into the field.

Intercept Rabbits Travelling to Distant Feeding Grounds.—Occasionally rabbits will travel long distances for the purpose of feeding on a crop of clover or it may be a field of roots. In the course of their journey they may have to cross an intervening field. On this they leave a series of parallel routes indicating a far-off destination. Such opportunities should

obtained. As all such runs will be very bright, each should be set with three snares. In the best main runs even four may be accommodated, the nearest wire to the covert or home of the rabbits being a minimum distance of 70 yd. or 80 yd. away. The other wires in each series may be spaced 20 yd. or 25 yd. apart. In a case of this kind the field which forms the particular attraction should be visited on the way to the snares. If a little noise is made by kicking against stones or by clapping the hands any rabbits which have passed the wires will be sent scampering home, so adding materially to the catch.

Snaring on Grass Land Exhibiting Plough Furrows.—Many grass fields bear the marks of bygone ploughing and fields carrying ridges and furrows are especially favoured by rabbits. When setting snares in fields of this kind I always endeavour to choose the beat from which the rabbit takes off when jumping the furrow. At such places it takes a leap rather longer than ordinary, with the result that the noose is drawn tight before he lands on the other side.

Arguments in Favour of Knotted Snares.—The arguments in favour of knotted snares are so strong as to justify the general adoption of the practice for all snaring whatsoever. This means that the wire should be knotted about 5 in. from the eye to prevent it from pulling up quite tight. Strangers who have witnessed the process of gathering rabbits caught in ordinary snares have very naturally deplored the cruelty inseparable from the process. Common sense tells even the most kind-hearted that the tortures inflicted will remain a necessity until equally effective methods of a non-objectionable order can be devised. Such persons nevertheless regret that improvements in detail are not more often experimented with. The chief suffering due to snaring as commonly practised is attributable to the semi-strangulation which follows the tight drawing up of the snare. Not only is the windpipe compressed, but the external blood vessels are also constricted, with the result that the rabbit's head becomes swollen. It has been alleged that rabbits which have suffered in this manner are unwholesome as food. Though my own experience does not support this contention, I agree that the simple knotting of the snare-wire would prevent the worst effects from developing. Especially would these be minimised if the recommendations in the direction of lifting snares daily and visiting them at night were adopted. The allegations referred to above might, of course, be true if the snared rabbits were

of the food would then be due to neglect of prompt gathering and not to the method of capture. At certain seasons of the year, particularly in the autumn, knotted snares permit very small rabbits and also mother rabbits suckling young to be released.

The Knotted Snare Serves for Taking Rabbits Alive.—Very often it happens that live rabbits are required for re-stocking warrens or for refreshing the blood of a stock deteriorated by in-breeding. The knotted snare suffices for this purpose, hence an important testimonial to its humane possibilities. The 5-in. distance of the knot from the eye is right when certainty of capture is the first consideration, but it should be increased to 5½ in. when capture in an uninjured state is more important. Rabbits which have been caught up in the manner suggested should be carefully examined to note whether their hind legs have been injured by entanglement with the wire. Whenever the snare is found to have cut into the flesh the rabbit should be killed, for even trivial wounds of this nature are liable to end in the leg rotting from gangrene.

Snaring Rabbits in Coverts.—Though rabbits lying out in coverts are usually reserved for shooting, there are times and places when the snare can be used with advantage. With the present shortage of cartridges the system is worthy of description. Snares may be set in all the runs in a covert, following which the rabbits may be driven to and fro with a steady "no chase" dog. It is really surprising what a number of rabbits may sometimes be taken in this way, more particularly in large coverts furnished with broad rides. Such snares should be set fairly high, say, 5 in. from the ground, and all the main runs should have two snares, set for preference one on either side of the ride. In both instances they should be set in the first long beat beyond the edge of the ride. The method here described is especially fruitful after going over the burrows in a covert with ferrets and gun. For several days following this operation the rabbits which have escaped lie out. Especially is this the case if the holes are well stopped after ferretting. When circumstances make the step advisable I see no reason whatever why the burrows should not be systematically "stunk out" beforehand. The effect is equivalent to that of ferretting. "Stinking" has special advantages of its own in the case of large and difficult burrows. Rabbits when hustled in the coverts run much more freely than when moving undisturbed in the open, hence they fall ready victims to snares set in those places.

RABBIT TRAPPING.—Trapping is the Most Effective Means of Taking Rabbits.—Granting always that the trap should not come into use till the month of November, it is from then onwards the most effective instrument of proper rabbit managemennt. A proviso to this general statement is that the ground to be worked must be suitable for trapping operations. That is to say, the soil must be of a sandy or loamy nature such as

permits of neatly covering the trap after it has been set in place. If the work is properly carried out in all its details the trap is quite as humane as the snare, if, indeed, it is not more so. Winged game and foxes are immune from the trap, but only provided that it is set well in the mouth of the burrows. Of course if traps are set outside the burrows nothing is safe from them. Few men who know their work ever set the trap in any other way than under cover, the exceptions being confined to those who to save trouble disregard the teachings of their own past experience.

Traps as an Instrument of Rabbit Preservation.—Contradictory as the idea may appear traps must be considered not only the best means of catching rabbits, but also the best means of maintaining a plentiful stock on the ground. The reason is plain to see. Traps not only catch rabbits, but they also catch the vermin which frequent rabbit earths. Rats, stoats, weasels, poaching cats—all fall victims to the trap set for rabbits. These animals in their several ways prey upon the rabbit, and are an important means of reducing the number available for human consumption. Very little trapping of any kind has been done during the last year or two. An alarming increase of vermin has resulted. The ultimate consequences are liable to be very serious if concerted measures are not immediately taken.

Best Form of Trap.—I always prefer to use for rabbits the ordinary size of trap with 4-in. jaws, though I am aware that many prefer a size smaller. All traps should be carefully examined before putting them into use, faulty welds in the chain and cracks in the S-hook being the defects most often found. If the swivel does not turn easily it must be worked till quite free. Oil may be used for the purpose, and perhaps fine emery. All traps of oil should be removed as soon as the desired freeness of working has been imparted. Traps wanted for immediate use should if possible be freed by the use of water. Complete immersion is necessary to ensure penetration into the joints. Much the best means of quickly cleaning a delivery of new traps is to place them in a kitchen copper and boil them for an hour or more. The scum and grease which rise to the surface should be removed. Following this treatment traps may be used at once.

Some Hints as to Pegs.—Wooden pegs are best for anchoring the trap chain to the ground. No fixed rule as to length of peg can be laid down; far better is it to be provided with an assortment of lengths to suit the various circumstances. The greatest length of peg likely to

be required is 16 in., though a length of 12 to 13 in. suffices for hard retentive earth. Endless trouble will be saved if from the start each peg is secured to the ring of the chain by a simple staple. Otherwise pegs are always dropping out, and as a rule fresh ones have to be made on the spot. These, at best, would be indifferently fashioned, and would not in any case have the benefit of seasoning. The pegs are driven into the ground by means of the round knob forming the handle of a proper trapping spade. This knob must be encircled by an iron band to prevent splitting. Mallets are useless for driving trap-pegs, for the reason that the peg as well as the trap must be set in the mouth of the hole for reasons explained below. The driving process in the conditions present resolves itself into bumping the peg into the ground by means of the up-ended spade.

Value of a Sieve.—For rough and stony or chalky ground a trapping sieve is of the greatest value, because it keeps small stones clear of the trap. The presence of even one of such is sufficient to prevent proper closing. The sieve, moreover, saves handling the soil, and it distributes its contents in the form of a mixture which blends well with the surrounding earth. To assist this important quality of blending I prefer to load the sieve with the soil actually removed in setting the trap. Some trappers reject the soil so removed if they judge it to be too full of stones, and they gather more sandy material from another place. Often this soil from a distance is of another colour, and possibly has quite a different smell. Rabbits anyhow seem to perceive the difference.

Where to Set a Trap.—The place to select for laying the trap is just inside the opening of the burrow. Careful examination will always show the position of the "beat," which is used equally for entry and departure. In cutting out the cavity to receive the trap first plant the spade across the hole at the extreme distance to which the trap will reach. Press it home so as to cut the soil about 2 in. deep. Then run the spade along each side, carrying the cuts from the far end towards the front of the hole. The total length so cut should be about 1 in. longer than the trap. The soil should next be removed to a depth of about 1½ in. The peg must then be driven into the centre of the space formed to receive the trap, and not on any account outside the hole. It should be driven flush with the bottom of the excavation and in such a position that the under-arm of the trap will eventually rest on the head of the peg. All traps should be set lengthwise in the holes and not across. If the latter is done it often happens that a rabbit treading on the outer edge of the pan will spring the trap, but not get caught, as the jaw throws the foot clear. These occasions are indicated by the finding of a bit of fur in the trap.

Reasons for Placing the Peg under the Trap.—Very important reasons underlie the advice given with regard to the position of t[illegible] A peg driven outside the hole and away from the trap preve[illegible]

rabbit, when caught, from obeying its natural instinct to draw back into the hole. When the peg is placed in the hole the rabbit can retreat, dragging the trap with it the full distance allowed by the chain. In this position the rabbit does not struggle to anything like the extent it would if gyrating around a peg set outside the hole. Safely hidden its fatalistic tendencies cause it to remain quiet, suffering a minimum of pain and not tempted to scream. I do not hesitate to say that ten per cent. of the rabbits which are trapped outside the hole twist off their legs and so escape in a mutilated condition. An important advantage of laying the trap inside the hole and not in the run outside is that should heavy rain come on after the traps have been set the covering of soil is not washed off the pan. I have even known rain to spring a lightly held pan. In frosty weather also, all traps set outside the hole are liable to be put out of action by freezing of the soil used for covering. In the mouth of the burrow the frost is seldom sufficiently intense to freeze the soil, and, moreover, the drier situation diminishes the amount of moisture in the soil.

A very important advantage incidental to placing both trap and peg in the position indicated is that foxes do not pull the rabbits out of the traps. They do not even attempt to scratch them out of the hole. The poaching dog has also to be considered. It will patrol the traps night after night, and drag the rabbits out wholesale. If a rabbit can draw well back into the hole there is little risk of wholesale losses from this cause, for even if the dog is doing its worst the time required to scratch out a single rabbit is considerable. Such dogs are usually chary of going any depth into a hole. Most of them have been caught in a trap at some time or another.

Special Hints on Laying Traps.—Several minor points need watching. Reference has already been made to the importance of a firmly-planted peg. After the peg has been driven home it should always be tested at once. An insecure peg may sometimes allow the rabbit to draw it inside the hole from where it can only be recovered by digging. After the peg has been tested the trap should be set as "light" as possible. This operation must be delicately performed to ensure that the jaws shall be released at the first contact of the rabbit's foot on the pan. If the "beat" has been properly located the jaws close on both front feet. The trap having been set to the required nicety it must be seated firmly in the prepared position. This is important, because a trap with any rocking tendency may topple over or move if the rabbit should happen to tread on the spring or jaws instead of on the pan. The soil should next be packed with a fair degree of firmness around the jaws. After that the spring should be covered, care being taken that the earth built up on either side should give as solid support as that lying on the spring itself. Should the soil be left in a compressible state the rabbit will know that something is wrong. A moment's consideration will show that this must be so, because the earth is always solidly compacted in

such places. If the soil is nice and fine there is no need to use the sieve at this stage. Whilst covering the pan I always insert a piece of stick made for the purpose to prevent the accidental springing of a lightly-set trap. A second piece of stick is used for smoothing down the soil, so that it shall present as natural an appearance as possible. If all is done in a workmanlike manner the earth is firm everywhere except in the critical place inside the jaws, where the pan is situated. The stick for preventing accidental springing of the trap is removed when all is complete.

Avoid Trapping Small Breeding Holes.—In trapping for rabbits it is well not to bother to set in the small breeding holes which show only one or two outlets. When large burrows are near such places do not often contain rabbits. Small holes, if left undisturbed, find tenants in due course, for the trapping of the larger burrows causes some of the rabbits to shift their quarters, and many of these retire to out-of-the-way places of this sort. When frost sets in and ordinary trapping ceases these small burrows fully repay attention, but they should be dealt with by means of ferrets and nets.

Trapping Large Burrows.—In the case of an extra strong burrow all holes which will allow of the trap being set inside the mouth should be set. Bolt-holes should be properly stopped. A mere sod of turf turned over them is not sufficient; they must be stopped for fully a foot in depth, and the material must be well rammed home with the knob end of the trapping spade. Otherwise rabbits will push their way out, and the haul will be spoilt as far as the particular burrow is concerned. Where rabbits are numerous traps may be left in the same burrow for as long as four nights, since many of those inside will not come out for the first night or two. Where possible, traps should be worked in batches so as to equalise each day's duties. For instance, when working, say, six dozen traps, two dozen may be moved to fresh ground each day. This allows three days in each situation, circumstances deciding whether it is long enough.

Stopping Up.—As the ground must be trapped at least twice each year, the task on the second visit is much simplified if at the time of removing the traps all but the three or four best setting holes are well stopped. When the time comes for the second set a much smaller number of traps is required, the rabbits being, of course, fewer. After the second time over the ground all holes should be thoroughly well stopped. Those afterwards scratched out indicate the number of rabbits left

behind, the result deciding whether a third visit is necessary. When holes are being stopped great care must at all times be taken to ensure that no bolt-holes have been missed. Once in a way these may be found a considerable distance from the main burrow. A single bolt-hole which has been overlooked will allow a large number of rabbits to escape.

Procedure for the Evening Visit.—Traps, like snares, should be visited in the evening, but in the case of traps the round may be made an hour earlier than that recommended for snares, say any time after six o'clock. A bull's-eye lamp will be found necessary on these occasions. Preferably, it should be provided with a shutter to mask the light when passing from one set of burrows to another. As traps which have caught rabbits must be re-set in the course of the round, either an assistant must be available to hold the lamp or a stand must be carried which enables the beam to be rightly directed. Neglect to re-set traps which have caught rabbits, or which have sprung without result, means loss. Not only does the rabbit escape which might have been taken, but others pass out by the same way. A properly-trapped rabbit blocks the hole in which it has been caught. Here, incidentally, is another reason in favour of laying both the trap and the peg inside the mouth of the hole. Traps when re-set must be placed exactly as before. In loose soil or sand this may present some difficulty, but with the peg as guide the risk of error disappears. Correct setting in the position previously chosen is called for by the necessity to lay the trap in the true beat. There is one just inside the hole and another outside. Should the trap happen to be re-set between the two the rabbit will hop or jump clean over it and so escape.

The Morning Visit.—This visit should be paid as soon as daylight is sufficient to collect all rabbits caught, re-set the traps, hang up the rabbits, etc. (The reason for dealing at once with caught rabbits is that any which may have got outside the holes will struggle violently to free themselves the moment daylight appears. During the dark hours of night they remain comparatively quiet.)

Removing Trapped Rabbits.—A rabbit which has been caught by means of a trap set in the manner here recommended will generally be found half an arm's length down the hole. In removing such a rabbit care must be taken not to withdraw it by pulling on the chain or trap. By so doing unnecessary suffering will be caused to the rabbit, and, moreover, the foot may be pulled off, so allowing the rabbit to escape. In all such cases the right hand should be passed into the hole, and the ears be gripped tightly. This done, the spring of the trap should be drawn gently forward with the left hand, the rabbit being eased out until it can be secured, when its neck should be broken.

(To be continued next month.)

"BROWN ROT" OF APPLES.

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THE DISEASE ON THE TREE.—During summer and early autumn apple trees are frequently attacked by a disease which produces on the fruit brown areas which gradually increase in size until the whole apple is affected; meanwhile, small pustular swellings appear beneath the skin and soon burst through as yellowish, powdery, cushion-like outgrowths, usually in concentric circles. The diseased apples begin to shrink in size and the skin becomes wrinkled (see Fig. 1). Such fruits, when hanging loosely, are easily detached and many fall to the ground during a high wind; the rot continues to develop on these windfalls, and more pustules are produced, to act as a possible source of further infection. When, however, a diseased apple is in contact with other apples or with a branch the pustules produced at the point of contact become adherent and may so attach the apple to the tree that some little force is required to detach it.

Method of Attack by the Parasite.—The disease is caused by the fungus *Monilia fructigena*, Pers. (= *Sclerotinia fructigena*, Schroeter). The powdery pustules which sooner or later appear on the affected apples are outgrowths of the fungus growing in the flesh of the fruit, and each consists of numerous chains of spores or reproductive bodies. The spores readily fall apart and are easily scattered by the wind or carried by insects to other apples. When they gain access to the flesh of an apple through any cut or rupture of the skin they germinate within a few hours, producing fungal threads (*mycelium*) which develop within the tissues and cause the characteristic "brown rot."

The rapidity with which the rot travels through the apples is illustrated by an experiment which was carried out in the plantation at Wye College in the summer of 1917.

On the 24th of July, while the apples were actively growing, and about 1 in. in diameter, ten of them were artificially injured by making a single puncture through the skin by means of a sterilized needle, and inserting in each puncture spores of *Monilia fructigena*, taken from a pure culture of the fungus which had been grown in the laboratory. Two days later it was seen that a brown rot had already made some progress, for round each puncture there was a discoloured area varying from one-eighth to half an inch in diameter.

rest of the apples on the tree showed no trace of the rot. A few pustules had by this time appeared on each of the ten, in a zone at about half an inch from the puncture; they were of a buff yellow colour, and when fully developed were about one-tenth of an inch in diameter.

Nine days later the whole surface of each inoculated apple was brown and bore numerous powdery pustules. Strong winds which occurred about this time caused nine of the apples to fall; the remaining one had been in contact with the branch and the pustules on that side had so attached themselves to the bark that although the stalk of the apple had become almost detached from the fruiting spur the fruit itself remained fixed to the branch by means of the pad of fungal threads.

When an infected apple is in contact with others on the tree the latter may become infected by contagion, and frequently a bunch of apples is found which shows fruit with the rot at various stages of development. Fig. 1 is a photograph of such a cluster of apples obtained from a tree of the Warner's King variety in late summer (mid-September). The disease had commenced in the small withered apple above; below this and in contact with it is another apple which had evidently been affected for some time, as it is much shrunken and wrinkled. The rot had extended from this apple to the one on the left, which, at the time the photograph was taken, was permeated with the fungus and bore numerous powdery pustules; but it was only very slightly shrunken and its surface showed but little wrinkling. On the right is seen an apple which was still quite sound.

Mummied Apples and Methods of Overwintering.—Those diseased apples which become attached to the tree usually remain in that position throughout the winter, becoming dry and shrivelled, and they constitute the so-called "mummied" apples. Many of the spores on the pustules of these "mummies" are washed away by rain or dispersed by the wind in winter; others remain on the pustules, but these usually lose their power of germination. As summer approaches, however, the "mummies" produce a new crop of spores and these cause infection of the young fruit. A "mummy" frequently infects the growing apples directly by contact, but in any case apples in the neighbourhood of a "mummy" are liable to spore-infection through wounds, and such newly-infected fruit will soon produce myriads of spores which serve to spread the disease. The spores are minute in size (only about $\frac{1}{1200}$ in. in length) and are easily dispersed by the wind; insects, too, crawling over the fruit may not only carry the spores from one apple to another, but biting insects, such as wasps, also produce wounds enabling the spores to reach the exposed flesh of the apple where they grow rapidly and reproduce the rot

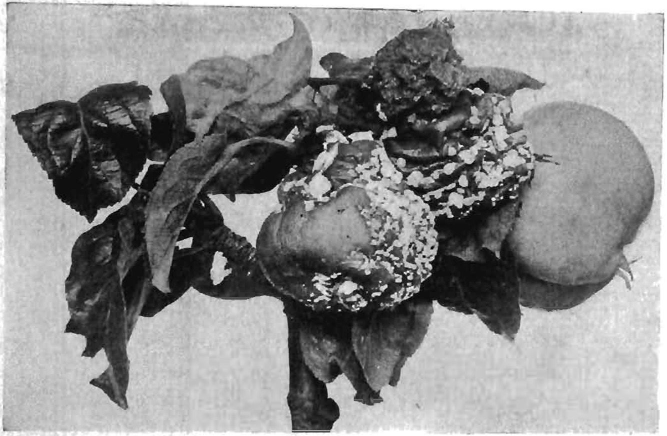

FIG. 1.—A cluster of apples (variety, Warner's King) attacked by *Monilia fructigena*.

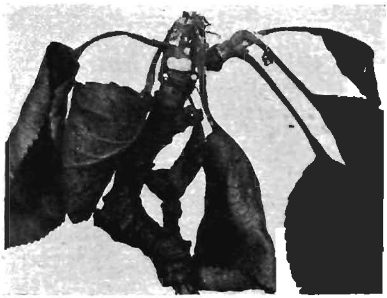

FIG. 2.—Fruiting spur, from a tree of the Lord Derby variety, bearing pustules of the fungus.

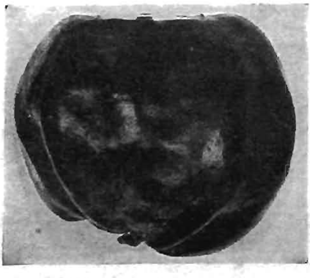

FIG. 3.—An apple (variety, Gladstone) obtained from the store; it had become black owing to infection by *Monilia fructigena*.

Spur Canker.—On some soft-wooded varieties of apples (*e.g.*, Lord Derby and James Grieve) it has been observed that the disease may extend along the stalk of the affected fruit and into the fruiting spur, or even as far as the branch itself, producing in the latter a canker round the base of the spur. In this capacity of forming cankers it resembles the "Blossom Wilt and Canker Disease" of apple trees caused by a closely-related fungus (*i.e.*, *Monilia cinerea*, Bon.), and already described in this *Journal*.* The two diseases are, however, quite distinct. In the case of the "Blossom Wilt," infection occurs through the open flower, while in the disease described in the present article infection takes place, so far as is known, only through the fruit. Fig. 2 shows the pustules of *Monilia fructigena* occurring on a fruiting spur of a Lord Derby apple tree; the apple in which the infection had arisen had fallen to the ground.

Control Measures.—From the preceding remarks it will be seen that the mummied fruits which are allowed to remain on the trees throughout the winter are the source of the new infection of the growing and ripening apples, and that the one certain preventive measure against the disease is the removal of the affected fruit from the trees. In gardens, allotments and small orchards it is possible to examine the trees at frequent intervals and any apple showing a brown rot, even in an early stage of development, should be promptly removed. On large fruit farms such a course would in most cases be impracticable, but the diseased apples should be removed as soon as possible. This operation might be carried out at the time of picking the crop, the diseased apples being gathered and destroyed, or if that is impracticable they may be dropped to the ground, where they are less dangerous than if left hanging on the tree.

It is advisable, where at all possible, to collect the affected fruit and remove it from the orchard or burn it; in plantations, where the ground is cultivated, such fruit should be dug into the ground. In any case it is imperative that none should be allowed to remain on the trees over winter.

Any affected spurs should be removed, together with cankers on the stem. This operation is best carried out in summer, but it may be done in winter provided it is completed before the fungus resumes its growth in spring.

* Vol. XXIV., No. 5, August 1917.

A Leaflet (No. 12) on "The Blossom Wilt and Canker Disease of Apple Trees" may be obtained free of charge and post free from the Board.

THE DISEASE ON STORED APPLES.—Apples are attacked by the disease not only while still growing on the tree, but also after they are picked and stored. At the time of storing they should be carefully examined and all those showing any trace of the rot should be discarded, for the disease will not only continue to develop in affected individuals, but may also extend to those around them. For the same reason great care should be taken when apples are selected for transmission to a distance in boxes; serious losses have occurred in boxed apples owing to neglect of these precautions.

An experiment carried out on apples after they were picked showed the rot developed in these at approximately the same rate as in the growing fruit, under conditions comparable with those under which apples are stored. Three apples (variety, Bramley's Seedling) were inoculated from pure cultures of *Monilia fructigena* and kept at the ordinary temperature of the laboratory throughout the experiment. At the end of eight days the rot had made considerable progress, as shown by a brown area about 1¾ in. in diameter on the surface of each apple, extending round the point where the inoculation had been made. The disease continued to develop and all three produced numerous yellow pustules of the fungus, and eventually became much shrunken and wrinkled.

Under certain conditions stored apples affected by *Monilia fructigena* turn black (as observed by Worthington G. Smith as long ago as 1885*), the skin remaining smooth or nearly so for some time and bearing few or no pustules. Although there is often no evidence on the exterior of such apples that a fungus is present, the flesh is permeated by the fungal threads, and particles of the flesh, placed on suitable culture media, give rise to the growth and pustules typical of *Monilia fructigena*; the black condition too, can be induced in the sound mature fruit by infecting them through wounds with this fungus. *Monilia fructigena* has always been isolated from such black apples (both of the cooking and dessert varieties) from the store at Wye College and from other places in Kent, and it has also been obtained by Spinks† from cider apples which have turned black. The precise conditions which cause the fungus to produce a brown rot in some cases and a black rot in others have not yet been determined. A black apple from which *Monilia fructigena* was isolated is shown in Fig. 3.

* The Gardeners' Chronicle, Vol. XXIV., new series, 11th July, 1885, p. 51–52.

† [illegible]

AN ALLOTMENT IN LEEDS, AND ITS LESSONS.

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DURING last year some 3,850 allotments, covering a total area of 300 acres, were under cultivation within the borders of the Leeds area. Many of these allotments had to be laid out on land which seemed utterly unsuitable, and in districts the atmosphere of which was so polluted with smoke as apparently to make success almost an impossibility. In spite of these drawbacks, however, the energy and enthusiasm of the allotment holders have given results which have been not only satisfactory but surprising, and in no case has the writer heard of an allotment being an absolute failure.

A large area was laid out in allotments by the Corporation on Woodhouse Moor, less than a mile from the centre of the city. The soil was anything but ideal; the area was acid, barren, open moorland less than 50 years ago; the situation is equally unfavourable as it is well inside the smoke area, while, in addition, the prevailing westerly winds carry over it the smoke from the Burley Valley.

Letter after letter was written to the papers, pointing out the utter futility of attempting to grow crops on Woodhouse Moor, and blaming the Corporation for allowing men to waste their time and strength in endeavouring to do so. Still the men carried on; they bastard-trenched, and limed and manured; and, putting their backs and their hearts into the work, they accomplished the seemingly impossible. One man obtained 3½ stone of onions from a small patch of 8 sq. yd., equal to 13 tons to the acre; a second got 42 lb. of peas from ¾ pt. which was sown in 3 double rows each 10 yd. long; a third planted 2½ stone of King Edward potatoes, and lifted 3 cwt. 0 qr. 22½ lb.—more than 10 times the quantity planted.

One of the most interesting series of allotments in Leeds was situated in the Shire Oak Road, in the residential suburb of Headingley, some two miles from the centre of the town. These were laid out by Mr. Bedford, the late Lord Mayor of Leeds, in a field adjoining his own house, and lent rent free (with certain minor restrictions) to his friends. The field had simply been used for the grazing of a carriage horse for the previous 24 years while in his possession, and had been laid

The land sloped gently towards the south, and the soil was a rich fibrous loam overlying the millstone grit, and had a lime requirement of about 1 ton to the acre.

The allotments were laid out in plots each 50 yd. by 4 yd., running north and south, and the conditions stipulated by Mr. Bedford were :—

1. That they should be used only for the cultivation of potatoes.
2. That the rows should be run north and south.

These conditions were partly for the sake of uniformity (the plots were not only close to his private residence, but also open to the road); partly because he was firmly convinced that there was no crop so economically important at the present time as the potato; and also because he felt that if the rows ran north and south the plants would get the maximum amount of sunshine.

Most plots were taken by professional men who took the keenest possible interest in them, and kept most careful and accurate records as to the details of cultivation and the actual yields obtained. Three were cultivated by Mr. Bedford himself, one by his gardener, one by a professor in the Leeds University, one by a well-known medical practitioner (who stated that the physical exercise taken on the allotment had enabled him to throw off a bad attack of sciatica), one by a curate in the neighbouring church, one by a local chemist, and one by the tax collector for the Headingley district.

The treatment of the plots varied in almost every individual case, but all the allotment holders took an intelligent interest in their work, and a keen rivalry existed between them.

The Owner's Plot.—Mr. Bedford took off the turf and sold it for potting soil at *6d.* per square yard cut, or *5d.* uncut. There was about 10 in. of fibrous loam with an open gritty subsoil, and this loam was manured with well-rotted stable manure made from peat moss litter, and a mixture of leaf mould and road sweepings. Half a load of each was applied to each plot of 200 sq. yd., corresponding to a dressing of approximately 15 tons to the acre. It was dug in before the end of March, and the plots were left ridged and ready for planting by the middle of April.

The sets were obtained on 1st March, 1917, from the Manor Farm, Garforth (Experimental Farm of the University of Leeds and Yorkshire Council for Agricultural Education), and consisted of 5 stone of Eclipse, 4 stone of British Queen, 10 stone of Great Scot, and 4 stone of King Edward—all Scotch seed, once grown, which, with the exception of the Great Scot, had been sorted in the ordinary way, and had passed through the 2-in. riddle (but failed to pass through the 1½-in. riddle). The Great Scot seed had been hand sorted, were well on the large side for "sets," and would have stood cutting.

The Eclipse were sprouted in the cool greenhouse, on shelves with full light where the temperature was somewhat irregular—varying from 42°–68° F. The British Queen were sprouted in a well-lighted cellar,

kept uniformly warm by its proximity to the boiler-house used for heating the radiators. Here the temperature all along kept constant between the narrow limits of 50°–52° F., and healthy, well-developed, greened sprouts of from ¾ in. to 1 in. were made. The Great Scot and King Edward were first placed in the summer-house for sprouting, and left there for two weeks. During this time the weather was very severe, the minimum night temperature falling to 34° F., and the maximum day temperature never exceeding 42° F. Two paraffin lamps were therefore kept burning at night, the windows were papered up to keep out the cold, and by this means the temperature was maintained at from 41°–43° F. As, however, the sprouting was still unsatisfactory the seed was on 6th April transferred to the cellar floor, where, at a temperature of 52° F., the seed soon began to sprout.

The rows were made two feet apart, six rows to each plot, and before planting on 25th April, a dressing of artificials was sprinkled in the trenches. The mixture was made up of 3 parts of bone meal, 5 parts of superphosphate, 2 parts of sulphate of ammonia, and 10 parts of dry boiler flue-dust containing 8 per cent. of potash.

This was applied at the rate of 7 lb. of the mixture per row of 50 yd., or 3 stone per plot of 200 sq. yd., corresponding to an application of

1¾ cwt. of bone meal .. .. .. }
2½ „ superphosphate .. .. .. } per acre.
1 „ sulphate of ammonia .. .. }
3 „ kainit .. .. }

After planting the sets, old lime riddlings from a builder's yard were spread on the top of the soil, approximately 1 ton to the three plots. The lime, however, had been overslaked and had set into hard lumps, so that it became incorporated with the soil so slowly that in the following December the soil still had a "lime-requirement" of approximately 10 cwt. per acre.

As the sets were planted 16 in. apart in the rows, an accurate estimate of the average weights of the individual "sets" of the various varieties can readily be obtained :—

Variety.	Weight Planted.	Length Planted.		No. of Potatoes Planted.	No. of Sets per Stone.	Average Weight per Set.
		In Rows.	In Yards.			
	stone.					oz.
1. British Queen	4	4½	225	506	126	1·8
2. Eclipse ..	5	5½	275	619	124	1·8
3. King Edward	4	5	250	562	141	1·6
4. Great Scot	4	3	150	338	84	2·7

It will be seen that the sets of the British Queen and Eclipse were quite normal, the King Edwards distinctly on the small size, and the Great Scot unnecessarily large.

On 16th May, 21 days after planting, the second early British Queen began to appear above the ground some 8 or 10 days before any signs were seen of the Eclipse; apparently the uniform sprouting of the former at the constant temperature of 52° F. in the well-lighted cellar had had its effects. On 3rd June the British Queen were fine plants, 6–7 in. high, the Eclipse averaged 4–5 in., and the Great Scot and King Edwards 2–3 in. The King Edwards were very irregular, many blank spaces

On 30th June a knapsack sprayer was used to spray all the plots with Burgundy mixture, made up by dissolving 9½ oz. of powdered copper sulphate in 2 gal. of water, and 11¼ oz. of washing soda separately in 2 gal. water, and mixing the two together so as to give 4 gal; 2½ gal. of the mixture were allowed for each plot of 200 sq. yd., a sufficient quantity being made up in a 35-gal. cask for spraying all the plots. The whole of the chemicals required for all the plots were kindly provided free by Mr. Bedford. Spraying was carried out in the cool of the evening, the solutions being first well mixed and tested as to neutrality to litmus. Half a row of Eclipse was left unsprayed as a control.

Up to this time no sign of blight had been noticed, nor, indeed, was there any sign of disease, even on the half row unsprayed, when the tubers were lifted on 15th September. While, however, the tops of the unsprayed lot commenced to go yellow and to fall by about 1st August, the rows which had been sprayed remained green for at least a fortnight later. On finally lifting and weighing the crop it was found that the half row unsprayed yielded 4 stone 6 lb., while the five rows sprayed yielded 55 stone 8 lb. In other words the portion sprayed yielded at the rate of 9·99 tons per acre, and the unsprayed yielded 7·98 tons per acre, the increased yield of the former of approximately 2 tons to the acre being presumably due to the spraying.

On 2nd July the King Edwards were looking distinctly unsatisfactory, and a good number of cases of leaf-curl were noticed. Although late in the season a top dressing of sulphate of ammonia was suggested. Accordingly ¼ oz. was sprinkled on the surface of the soil within a radius of 6 in. round each stem, care being taken not to allow it to come within actual contact. This would correspond to a dressing of approximately 2¼ cwt. per acre. With the object of testing the result of the application of this top dressing, four rows only of the King Edwards were so treated, the remaining one being left untreated. Up to the time of application of the sulphate of ammonia little or no rain had fallen for more than a month, and the soil was loose and dry to a depth of 9–10 in. Accordingly all five rows were well watered with the hose pipe, which damped the soil to a depth of at least 1½ in., and gave the sulphate of ammonia an opportunity of getting into solution. A break in the weather, accompanied by heavy rains, occurred on 17th July. A great improvement in the appearance of the treated plants was soon noticed, and this improvement was clearly shown in the increased yield on lifting. The one row, not treated, yielded 7 stone 10 lb. (= 6·99 tons per acre), and the four rows receiving the top dressing yielded 39 stone 4 lb. (= approximately 9 tons to the acre).

The following table summarises Mr. Bedford's final results:—

Variety.	Weight Planted.	Area Planted in Sq. Yd.	Actual Yield.	Yield per Acre.	Increase in Terms of Seed Planted.	Date Lifted.
	stone.	sq. yd.	stone.	tons.		
1. British Queen	4	150	42	8·47	10·5 fold	26 Sept.
2. Eclipse ..	5	184	60	9·88	12·0 ,,	15 ,,
3. King Edward	4	166	47	8·41	11·8 ,,	5 Oct.
4. Great Scot ..	4	100	25	7·56	6·2 ,,	10 ,,
Total or Average	17	600	174	8·58	10·1 fold	

The Professor's Plot.—Professor Barker bastard-trenched his plot, burying the turf, and adding three loads of horse manure and one load of cow manure. The loads were small, probably 15 cwt. each, but a total dressing of 3 tons to the plot was decidedly heavy, equal to about 72 tons per acre. The digging was started in December, 1916, and finished in April, 1917. Seven varieties of sets were obtained—half a stone of each variety. These arrived at the end of April, and were not sprouted. They were planted in rows 2 ft. apart, and 12 in. apart in the row. The plot, therefore, contained 6 rows, each 50 yd. long. As the 3½ stone of sets were not sufficient to plant the plot, additional sets were obtained, part from the Leeds market and part from a Headingley greengrocer. In each case the sets were simply small potatoes picked from samples of eating potatoes of unknown pedigree and history.

The following summary of Professor Barker's results is certainly interesting and instructive :—

Variety.	Seed Obtained from	Weight Sown.	Yards Sown.	No. of Sets per Stone.	Average Weight per Set.	Total Yield.	Yield in Tons per Acre.	Increase in Terms of Seed Planted.
		lb.			oz.	lb.	tons.	
Dalhousie ..	Bees ..	7	38	228	0·98	101	8·6	14·4 fold
Eclipse ..	,, ..	7	39	234	0·96	111	9·2	15·9 ,,
Great Scot ..	,, ..	7	14	82	2·73	69	15·9	9·9 ,,
Up-to-Date ..	,, ..	7	21	126	1·77	133	20·5	19·0 ,,
British Queen	,, ..	7	25	150	1·49	84	10·9	12·0 ,,
King Edward	,, ..	7	25	150	1·49	88	11·4	12·6 ,,
Arran Chief..	,, ..	7	27	162	1·38	56	6·7	8·0 ,,
Total for Best Seed ..	.. ..	49	189	162	1·38	642	11·0	13·1 fold
Eclipse ..	Leeds Market	7	27	162	1·38	53	6·4	7·6 fold
King Edward	,, ,,	7	36	216	1·04	38	3·4	5·4 ,,
Up-to-Date ..	Headingley Greengrocer.	12	48	288	0·77	54	3·6	4·5 ,,
Total for Nondescript Seed	.. ..	26	111	223	1·06	145	4·5	5·6 fold

The Doctor's Plot.—Doctor Mayo bastard-trenched his plot, burying the sod face downwards and chopping it up into very small pieces, and applied 3 loads of stable manure to the plot of 200 sq. yd. The cultivation of the plot was started on 26th December, 1916, and completed on 24th March, 1917. The sets were all sprouted in boxes, the earlies were planted on 19th April, and all the sets were in by the first week in May. The sets were obtained from a local nurseryman who stated that the Arran Chief were Scotch seed and that the others had been grown in Lincolnshire. The Eclipse and Sharpe's Express were planted thickly in rows 18 in. apart, and the sets 12 in. apart in the rows; the British Queen and Arran Chief in rows 2 ft. apart, and the sets 12 in. apart in the rows.

A proportion of the potatoes grown was slightly holed by wireworms, but very few so badly that they had to be given to pigs. A small number, mainly the Arran Chief, were also attacked by black slugs. With the exception of 7½ lb. of potatoes, mainly sound, but too small for cooking which were consequently given to pigs, all the produce from the plot has been actually consumed by the

The following is a summary of the results on Dr. Mayo's plot:—

Variety.	Weight Planted.	Weight Lifted.	Increase in Terms of Seed Planted.	Yield per Acre.	Average Weight Per Root.
	lb.	lb.		tons.	oz.
1. Eclipse	23	187½	8·1 fold	11·04	14·38
2. Sharpe's Express ..	10	70½	7·0 ,,	9·20	12·4
3. British Queen ..	36	331½	9·2 ,,	10·29	17·3
4. Arran Chief	40	321	8·0 ,,	10·60	20·4
Total or Average	109	910½	8·1 fold	10·28	

It is an important economic fact that the eight plots (approximately a third of an acre—part of a field which up to last year had done nothing for 50 years except to find food for a pleasure horse) produced altogether 3 tons 16 cwt. of potatoes, sufficient to provide *three men with their daily requirements of 3,400 calories for one year.*

It was ascertained that:—

(1) It is more economical *to give a medium dressing of dung and supplement with artificials* than to give excessively heavy dressings of dung alone. Thus Mr. Bedford, who sold the turf and applied only 15 tons of dung per acre, supplementing with artificials, got a return of 9 tons of potatoes per acre; Dr. Mayo, who in addition to burying the turf gave the heavy dressing of 57 tons of dung per acre, only got a return of 10 tons per acre, or one ton more than Mr. Bedford; and Professor Barker, who in addition to burying the turf gave the excessive dressing of 72 tons of dung per acre, obtained a return of 11 tons. Mr. Bedford's potatoes were produced at the cheapest rate.

(2) It undoubtedly pays to *get seed potatoes from a reliable firm—if possible Scotch seed direct from Scotland* or, failing that, Scotch seed once grown in the district. Thus Professor Barker's Up-to-Dates, obtained from a reliable firm, yielded 20·5 tons to the acre, and the same variety picked up casually only yielded 3·6 tons; his King Edwards, obtained from a reliable firm, yielded 11·4 tons to the acre, and those picked up in the market only 3·4 tons; his Eclipse, from a reliable firm, yielded 9·2 tons to the acre, and those obtained from the market only 6·4 tons. To go to the trouble of bastard-trenching and to the expense of manuring with dung at the rate of 72 tons to the acre, and then to plant nondescript sets, picked up casually, is to court disaster and to waste both

(3) *It certainly pays to spray potatoes*, as it not only checks and prevents blight, but prolongs the growth of the plant, and tends to give an increased yield. The portion sprayed on one of Mr. Bedford's plots gave an increased yield of approximately 2 tons to the acre, as compared with a similar portion on the same plot which had not been sprayed.

(4) If the land is in need of lime, as is probably the case with most land in the neighbourhood of an industrial town, the lime applied must be *in a fine state of division* if it is to become incorporated with the soil. The soil on Mr. Bedford's allotment had a lime "requirement" of 1 ton to the acre. Mr. Bedford applied a dressing of 8 tons to the acre, using lime that had been overslaked and had set into large lumps; and the soil still had a "lime requirement" of ½ ton to the acre.

(5) When plants are flagging from drought, a *top dressing of sulphate of ammonia* will usually help them along, even when applied as late in the season as the end of June, *provided that the conditions are such that the sulphate of ammonia can get into solution in the soil.*

REPORT OF THE TITHE, COPYHOLD, COMMONS, AND SURVEY BRANCH OF THE BOARD FOR THE YEAR 1917.*

THE Report for the year 1917, on the Proceedings by the Board under the Tithe, Copyhold, Inclosure and other Acts, administered through the Tithe, Copyhold, Commons, and Survey Branch of the Board, deals chiefly with the question of tithe rentcharge.

TITHE ACTS, 1836 TO 1891.—The oldest of the duties with which the Board are charged are those arising from the administration of the Acts relating to tithe rentcharge and other payments in lieu of tithes in kind. Generally speaking tithes may be described as the tenth part of the annual increase arising from the lands and the stock upon the lands. With certain exceptions tithes were payable on common right in respect of the produce of all lands which were not barren.

The practice of taking tithes in kind continued for several centuries, but in many respects this mode of payment was inconvenient to both the receiver and the payer of the tithe. Accordingly, in many parishes the practice arose of

* [illegible]

compounding for tithes by payments called moduses, a modus being a composition made between the parson, patron, ordinary and landowners before the time of legal memory, *i.e.*, before the year 1189, whereby the landowners agreed to pay the parson for the time being for ever a certain sum of money or other thing in lieu of tithe.

An objection to a money modus was that any fixed money payment is necessarily liable to great fluctuations in purchasing power. For instance, a very common modus was 2*d.* an acre in lieu of the tithes of the produce of the lands, and it may reasonably be assumed that this sum was the full value of the tithes when the modus originated, *i.e.*, before the year 1189; but it has been estimated that at the time of the general commutation in 1836 the average value of the tithes in kind of an acre of land was about 4*s.* Thus, in the course of centuries the effective value of a modus had been depreciated to about one twenty-fourth part of what it was in the twelfth century.

The expedient of substituting corn, which is not liable to the same depreciation as money, was adopted as regards college leases by the Statute 18 Eliz. c. 6, which directed that one-third of the old rent, then paid, should for the future be reserved in wheat or malt, reserving a quarter of wheat for each 6*s.* 8*d.*, or a quarter of malt for every 5*s.*, or that the lessees should pay for the same according to the price for which wheat and malt should be sold in the market next adjoining to the respective colleges, on the market day before the rent became due.

"It has been said that this was an invention of Lord 'Treasurer Burleigh, and Sir Thomas Smith, then principal Secretary of State, who, observing how greatly the 'value of money had sunk, and the price of all provisions 'risen, by the quantity of bullion imported from the new-'found Indies (which effects were likely to increase to a 'greater degree), devised this method for upholding the 'revenues of colleges. Their foresight and penetration has in 'this respect been very apparent; for, though the rent so 'reserved in corn was at first but one-third of the old rent, or 'half of what was still reserved in money, yet now the pro-'portion is nearly inverted; and the money arising from corn 'rents is, *communibus annis*, almost double to the rents reserved 'in money." (*Blackstone's Commentaries on The Laws of England*, 21st Ed., Vol. II., p. 322.)

During the century preceding the passing of the Tithe Act, 1836, about 2,230 local Inclosure and other local Acts were passed in which provision was made for the commutation of

the tithe, in some cases of the lands to be inclosed, and in some of the whole parish. In order, no doubt, to avoid to some extent the fluctuations in purchasing power to which fixed money payments are liable, some of the money payments created under these Acts were calculated on a certain price of corn, and were made subject to variation, on application to Quarter Sessions at specified intervals of years, on the basis of the increase or decrease in the average price of corn during a specified period previous to the variation.

The Tithe Act of 1836, which provided for the commutation of all the remaining tithes in England and Wales into tithe rentcharge, directed that every tithe rentcharge, at the time of the confirmation of the Tithe Apportionment, should be deemed to be of the value of such quantities of wheat, barley and oats as the sum would purchase in case one-third part thereof were laid out in wheat, another third part in barley, and the remaining third part in oats at the average prices for the seven years ended Christmas, 1835. The Act further provided that after every first day of January, the sum of money payable in respect of the rentcharge should vary so as always to consist of the price of the same quantities of wheat, barley and oats, respectively, according to the average prices for the seven years ended the next preceding Christmas.

Eighty-two years have now elapsed since the Act of 1836 was passed. During the earlier part of this period the annual variations were on the whole favourable to the receiver of the rentcharge, but in recent years they have greatly favoured the payer of the charge. In 31 of the 47 years from 1837 to 1883 inclusive, the value of tithe rentcharge exceeded par, but in every year since 1883 the value had been below par until the present year, when it stands at £109 3*s.* 11*d.* for each £100 of tithe rentcharge. This last-mentioned value represents an increase of £17 2*s.* 10¾*d.* on the previous year's figure, and is only £3 11*s.* 7¾*d.* less than that for 1875, when tithe rentcharge reached its highest level.

Now that, after the lapse of many years, the variations in the value of the charge seem likely again to operate in favour of the tithe-owner for some years to come, the Board have received many representations from various bodies and individual landowners to the effect that tithe rentcharge should be fixed either at par or at some amount below the par value of the charge. Landowners seem generally to admit that, in increasing with the price of corn, tithe rentcharge is merely doing what the Legislature intended that it should do, but they urge that the

increase in corn prices is largely due to the "U' and other factors which were quite outside the conten of the parties to the statutory bargain made in 1836. connection it may be interesting to recall that the Commission on Agriculture, 1879, recommended tha rentcharge should be fixed and invariable, and that titl charge charged on property in the City of London un London (City) Tithes Act, 1879, and the 4 per cent. ren payable under the Extraordinary Tithe Act, 1886, a subject to variation.

The effect of the Corn Production Act, 1917, on th of tithe rentcharge is often misunderstood. The amou able under the Tithe Acts in respect of any tithe ren varies from year to year in accordance with the average prices of wheat, barley, and oats for the seven precedin as published in the "London Gazette," and these pri not be affected by the provision in the Corn Producti securing certain payments to the grower, where the price of either wheat or oats, determined as prescribed Act, falls below the "minimum" price specified in the

There is nothing in the Act to prevent a landown obtaining an increased rent to cover his increased out including tithe rentcharge, provided that the effect guaranteed prices is left out of the account; and, in the market prices which now rule for wheat and oats a probable market prices for the next few years, the infl the guaranteed prices on rents is in any case likely to slight indeed.

It is frequently suggested that the best solution problem resulting from the rapid increase in the value rentcharge is to provide greater facilities for rede The existing provisions for the redemption of tithe ren are contained in the Tithe Acts, 1846, 1860 and 1878, a be summarised as follows :—

(a) When the land has been taken for places of worship, ce schools under the Elementary Education Acts, to court-houses, gaols, lunatic asylums, hospitals, or a public buildings, or under the Housing of the Workin Act, 1890; or for sewage farms under the Sanitary for the construction of any sewers or sewage works, or or waterworks, or for enlarging or improving premises any of the above-mentioned purposes, the Tithe A requires that the rentcharges shall be redeemed; and t cation is to be made by the persons in possession of before the land is applied to any of the purposes afore rentcharge being redeemable for 25 times the amount

(*b*) When the land is charged with a rentcharge not exceeding 20*s*., application for redemption may be made by the landowner, or by the owner of the tithe rentcharge, and the rentcharge is redeemable, if the Board see fit, for 25 times its amount.

(*c*) When the land is charged with a rentcharge exceeding 20*s*., the rentcharge may be redeemed on the joint application of the owner of the land and the owner of the tithe rentcharge for a sum not less than 25 times its amount; but when the rentcharge is held in right of a benefice, the consents of bishop and patron are also necessary, and may be signified on the application.

(*d*) When the land has been divided since the last apportionment into numerous plots for building or other purposes, so that no further apportionment can conveniently be made, the application may be made by the owner of any of the plots, or by the owner of the tithe rentcharge, and the rentcharge is redeemable for 25 times its amount. An application made by a landowner must not include any number on the tithe map which has a separate rentcharge, unless he owns part of the land to which it refers.

In all cases the basis of redemption is the amount set out in the tithe apportionment, and not the varying value according to the corn averages from year to year.

It is often overlooked that in certain circumstances tithe rentcharge may be extinguished by a declaration of merger as an alternative to redemption. The consideration for merger is a matter for arrangement between the landowner and the titheowner, the fee payable to the Board is less than in the case of redemption, and declarations of merger are not subject to stamp duty. The following persons may execute a declaration of merger :—

(*a*) A titheowner who is entitled to the rentcharge in fee simple or fee tail in possession, or has the power of disposing of the fee simple in possession therein, although he does not also own the land charged therewith.

(*b*) A titheowner who is entitled to the rentcharge as tenant for life, provided that he owns also the land charged with the rentcharge, and that both the rentcharge and the land are settled to the same uses.

A tenant for life who does not also own the land can, as a rule, with his trustees and the owner of the land, execute a bargain and sale to the intent that the rentcharge shall merge in the land.

(*c*) A person entitled in equity to tithe rentcharge may execute a declaration of merger in all respects as if he were legally entitled thereto.

(*d*) A clerical incumbent entitled in virtue of his benefice to tithe rentcharge charged on glebe lands of his benefice can merge the rentcharge in the land.

Out of an original total of £4,054,405 of tithe rentcharge apportioned on lands in this country under the Tithe Acts

only £72,513 has been redeemed, and £156,866 merged. Extraordinary tithe rentcharge, the amount of which at the commutation cannot be accurately stated, has been converted under the Extraordinary Tithe Redemption Act, 1886, into the 4 per cent. rentcharge provided for by that Act, while a certain amount of ordinary tithe rentcharge has been extinguished in exchange for land under the provisions of the earlier Tithe Acts. On the other hand, variable corn rents have been converted into tithe rentcharge amounting in all to £6,921 under the Tithe Act, 1860. Making due allowance for all these transactions the total amount of tithe rentcharge now payable is £3,678,675, so that in the course of 82 years the provisions for extinguishment have resulted in a diminution of the total charge by 9 per cent. At this rate it will, under existing legislation, take over 800 years to complete the extinguishment of tithe rentcharge in this country.

This slow rate of extinguishment is no doubt chiefly owing to the fact that the conditions under which tithe rentcharge may be redeemed have, for many years past, been unduly favourable to the titheowner, and correspondingly unfavourable to the landowner. Allowing 5 per cent. for collection and rates at 5*s.* in the £, an assessable value of, say, £76, equal to £19 full rates and £9 10*s.* half rates, the net value of tithe rentcharge to the lay impropriator would be :—

	£	*s.*	*d.*	£	*s.*	*d.*
Present value of tithe rentcharge				109	3	11
Less cost of collection	5	9	2			
„ full rates	19	0	0			
				24	9	2
Value to the impropriator				£84	14	9

On the other hand, the value to the incumbent, who, under the Tithe Rentcharge (Rates) Act, 1899, pays half rates only, would be £9 10*s.* more, namely, £94 4*s.* 9*d.* As compared with this sum, the income derived by the incumbent after redemption at 25 years' purchase would be 5 per cent. on £2,500, that is £125, and such income would not be subject to rates. The landowner would be relieved of the full amount of the charge, £109 3*s.* 11*d.*, but the land would be liable to re-assessment for rating purposes, and in these circumstances redemption at the present time offers but little attraction to the landowner as an investment.

It is obvious that, if redemption is to be made more popular, drastic alterations in the terms under which redemption may be effected must be made, and that any proposals which would involve an increase in the official fees or in other expenses of, or incidental to, redemption must be avoided. It may be of interest to note that in the Report of the Royal Commission on Redemption of Tithe Rentcharge, 1892, it was recommended, *inter alia*, that "the existing terms of 25 years' purchase of "commutation value for the redemption of tithe rentcharge "should be abolished; that where redemption is voluntary the "precedent of the Glebe Lands Act, 1888, should be followed, "and the parties be encouraged to make their own bargains, "subject to a determining authority as to the price of redemp- "tion to be vested in the Board of Agriculture; that in the "case of clerical rentcharges a notice to the bishop and "patron should be substituted for the present provision which "requires their consents in certain cases; and that where "redemption is compulsory the terms should be fixed by the "Board of Agriculture."

The Commission further recommended that the fees payable should be reduced and, if possible, abolished in the case of small rentcharges. They also suggested that any legislation for facilitating the redemption of tithe rentcharge should be made applicable, with suitable modifications, to corn rents and other payments in lieu of tithe arising under local Acts of Parliament. Many such Acts provide that the payments which they impose shall not be subject to rates and taxes, and this fact should apparently be taken into consideration in any revision of the terms under which the payments can be redeemed.

There are no available statistics showing the proportions of the tithe rentcharge now payable which are owned by parochial incumbents and other classes of titheowners respectively. The following statement, however, shows the proportions at the time of the commutation:—

Owners.	Tithe Rentcharge.
	£
Parochial incumbents	2,412,104
Lay impropriators	766,206
Clerical appropriators and their lessees	680,039
Schools, colleges, etc.	196,056
Total	£4,054,405

Since the commutation there have been numerous dealings with tithe rentcharge. A considerable amount of impropriate and appropriate tithe rentcharge is held by the Ecclesiastical Commissioners, and a great deal has been annexed to various benefices either through the Ecclesiastical Commissioners or by direct gift. Many colleges, hospitals and other charities own tithe rentcharge, while some is held by municipal bodies, such as the Corporations of Coventry and Bury St. Edmunds, respectively.

Investigations at the National Fruit and Cider Institute.

THE Board have received from the Agricultural and Horticultural Research Station (National Fruit and Cider Institute), Long Ashton, Bristol, a copy of the Research and Advisory Report of the Station for the year ended 30th September, 1917. Owing to the prolongation of the War and the consequent need for the concentration of all effort on work of immediate national importance, and also to the reduction of the scientific staff, the ordinary research and experimental work has been reduced to the smallest possible proportions, and the land is being cultivated in the interests of national food production.

Courses of training in fruit culture for partially disabled officers to last over a period of 2 years have been arranged at the request of the Board of Agriculture and the Ministry of Pensions.

The following is a summary of the main work of the Station during the year under review :—

Stock Influence on Fruit Trees.—The apple root stock investigations which have been for some years jointly conducted at the East Malling Fruit Station and Long Ashton have now reached a point where the first stage of the work can be considered to be complete.

At East Malling the classification of the various types of Paradise root stocks in use in the fruit nurseries of this country and, to a less degree, in France, Holland and Germany, has been thoroughly worked out, and an exhaustive report on the individual types has been recently published. Each type is being propagated extensively with a view to the organisation of extensive comparative trials at suitable centres, and it is expected that the first supplies will be budded with the selected test varieties during the year 1918.

At Long Ashton sufficient information as to the various types of root system occurring among free and crab stocks has

been gained to permit of the grading of individual stocks into more or less well-defined classes, and selected plants representing each class are being propagated as rapidly as the character of the individuals will permit. When sufficient supplies are available comparative trials of the same kind as those arranged for the Paradise types will be started.

Fruit Bud Formation.—The observations on fruit bud formation, begun in 1916, have resulted in the accumulation of many data tending to throw light upon the causes which determine the line of development of the individual bud, whether into the vegetative type or into the fruit bud. It is already evident that many factors are involved, and that, given the necessary knowledge of the action of individual factors, a considerable degree of control over the potential crop for the following season could be attained by suitable treatment of the tree during the growing period of the year, particularly during the latter half of the growing season. The practice of summer pruning is the means of effecting this control adopted by fruit growers, but the variability in the results of the treatment is sufficient indication that the method as ordinarily practised is limited in its usefulness on account of the absence of precise knowledge of the conditions which should be taken into consideration. The variations in the response of individual trees under different conditions to summer pruning, which have been observed in the course of the experimental work on this subject, have served to throw considerable light upon the factors involved and the respective courses of action necessary to suit prevailing conditions. Several sets of experiments to test individual points have been started.

Spot Disease of Apples.—Investigations were made on the origin and development of spots which occur on apples in store. These spots were found to be caused by various fungi, but the real source of the trouble appears to be some physiological effect which produces weak places in the cuticle of the apple through which the fungi can obtain an entrance. Attempts are now being started to discover conditions of storage which will prevent the fungi from entering the apples and will also prevent their extensive growth even if they enter.

Further Studies on the Fruit Blossom Bacillus.—This organism, which was discovered in 1913 at Long Ashton to cause a serious disease of fruit blossom and of flower buds, especially in the case of pears, has been further studied during the succeeding years, and several new facts as to the disease have been observed.

The characters of the organism have recently been determined in considerable detail, partly on account of the discovery of a somewhat similar form in South Africa which causes a fruit blossom disease there, and partly owing to the discovery of the existence of an apparently identical form in considerable numbers in soil. The latter fact was observed soon after the disease was first investigated at Long Ashton; but the more recent observations that the bacillus occurred in large numbers in close association with the fine roots of growing plants, and that the quantity in portions of the soil not permeated by roots was insignificant, added considerable interest. A careful comparison of the root form and the blossom form has proved that the two are probably identical, the difference between individual cultures being extremely minute. In view of the fact that the organism produces ammonia readily from proteid nitrogen and other organic nitrogenous substances, its effect on seedlings and growing plants was tested. In unsterilised soil in open ground the watering of the roots with a vigorous culture of the bacteria gave no positive result, but in the case of seedlings in sterilised soil a definite stimulus to growth was observed in some of the experiments. The negative result in unsterilised soil may be due to the natural presence of the organism in adequate numbers. Further experiments are necessary before definite conclusions are drawn as to the significance of the organism in the soil.

Further Experiments on the Rhizoctonia Disease of Asparagus.—The experiments on the infected land at Badsey which were begun in 1916 have been continued with a few minor modifications. The 1916 results showed that treatment of the soil with carbolic acid or naphthalene offered little promise of success. Accordingly the plots originally treated with those substances were in the 1917 trials dressed with bleaching powder and creosote respectively, those substances having in the previous season had most effect. The other plots were dealt with as in 1916. The test crop grown was again carrots. The results corresponded generally with those obtained in 1916, the control plots being full of disease and the remainder showing a limited quantity only, the amount varying according to the nature of the fungicide applied. Bleaching powder and creosote again stand out as distinctly the most efficient fungicides, the former especially producing striking results. On the plot which has now been treated with it for two consecutive seasons, the disease appears to have been practically eliminated and the crop has not been adversely affected in other ways.

It now seems worth testing the effect of bleaching powder and certain other chlorine-containing preparations on other types of pathogenic soil fungi, the forms of treatment hitherto in vogue being very unsatisfactory. An extension of the experiments at Badsey on a larger scale is being arranged for 1918.

Big Bud Disease of Black Currants.—During the winter further work on this disease was done. Diseased bushes were sprayed during the dormant season with the carbolic-soft soap wash previously found the most successful of all the mixtures used. The effect of one and two sprayings at three different periods was tried. In the most successful combination the number of living and checked big buds was reduced to 16 per cent., 84 per cent. being completely killed.

"Reversion" in Black Currants.—Work described in a previous report led to the conclusion that any injury to the terminal bud of a shoot was liable to lead to reversion. Considerable light has been thrown on the problem through examination of some material kindly sent by Messrs. Seabrook and Sons. Shoots from "Seabrook's Black," a mite-resistant variety, showed interesting and characteristic small buds when examined in winter. The growing point of these buds had been killed, presumably by mite attack during the summer. The resistance offered to mite attack was apparently due to this fact, although several subsidiary factors also affected the case.

Reverted wood was found to be caused by the normal terminal bud being replaced by a small "killed" bud, a "blind" bud, a "big" bud, or a fruit bud. All would produce a distinct check to normal apical growth in the spring and cause undue growth of the lateral buds, a condition always associated with reversion. These causes account for the greater number of cases of reversion found amongst commercial plantations. There is, however, one kind of reversion, the cause of which is still obscure. This is being investigated at Long Ashton.

Raspberry and Loganberry Beetle (*Byturus tomentosus*).—From previous laboratory experiments it had been found that the killing power of dilute nicotine solutions was greatly increased by combining them with paraffin emulsions containing 2 per cent. each of soap and paraffin.

The emulsion acts in this case as a carrier. The combination: Paraffin, 2 gal.; soft soap, 20 lb.; nicotine, $\frac{1}{4}$ lb.; and water, 100 gal., was tried against the loganberry beetle as soon as it appeared on a commercial plantation near Evesham. By a suitable method of spray application the number of infest

berries was reduced from 100 per cent. on the control row to 33 per cent. on the sprayed row.

Copper Stearate Mixtures.—The need for a protective fungicidal spray with better covering and wetting power than is possessed by Bordeaux or Burgundy mixtures led to an investigation of the possibilities of obtaining a mixture containing free soap. For some time difficulties of a chemical nature prevented a solution of the problem, but these have now been overcome. A mixture has been obtained which possesses certain valuable properties. Any amount of wetting power desired can be obtained and the film left after spraying is such that the distance between contiguous particles is far smaller than the diameter of any fungus spore. It may thus be regarded as continuous. It has good adhesive powers and considerable resistant properties to water, and will. therefore, probably stand weather conditions. Its fungicidal properties have not yet been absolutely proved, but the copper is in a form soluble enough to be taken up by bean seedling roots, where characteristic copper blackening was obtained. This indicates that the substance will probably prove fungicidal. Further tests are being carried out.

Cider Vinegar.—One of the results of the War is a shortage of malt vinegar, which seems likely to increase. The possibility of reviving the use of cider vinegar has been considered and a number of inquiries concerning this product have been received. Experimental work in connection with its production is in hand and attention has also been given to its use for pickling purposes. Some practical difficulties which hitherto limited its utility, such as the development of turbidity after pickling, have now been overcome; and as stocks of malt vinegar become further reduced it is possible that cider vinegar may be extensively used. Steps are being taken to carry out trials for its production on a commercial scale.

The Bacteria of Ropy Cider.—While methods of treating ropy cider to make it fit for consumption had been worked out previously, the organism or organisms causing the disorder in English cider had not hitherto been isolated, and therefore investigations on the prevention of ropiness were seriously hampered. Two bacteria capable of causing ropiness have now been successfully isolated from ropy cider as the result of the past season's work, and their characters have been already fairly thoroughly examined. With the information thus gained and from work on the growth conditions of the organism still in progress, the problem of prevention of ropiness should be considerably simplified.

The Utilisation of Pressed Cider Apple Pomace.—Much further work has been done on this subject. The market value of this pomace has risen to from £1 to £2 per ton according to district, and, since the amount of the pomace produced as a by-product in cider-making is ⅓ to ¼ of the total weight of apples used, it represents an asset of some value to the cider maker. Several methods of preserving pomace, suitable for use on farms, are being examined; but the bulk of the supply now being produced is either utilised in its fresh state for stock-feeding or is being distributed to various drying centres. The collection of stocks for the latter purpose is being organised by the Station, and arrangements have been made which will prevent the greater part of the waste which has hitherto occurred.

The experiments on the feeding value of the pomace for pigs, which were begun at Seale-Hayne College in the autumn of 1916, were continued into the New Year so long as supplies of apples and pomace were available. They demonstrated that pomace possesses distinct value as a food. In its dried form it is now being used as a "filler" in place of bran in compound cattle cakes, but it is certainly proved that it must be regarded as something more than that.

Apple Pectins.—The investigation of the chemistry of these substances is being proceeded with, but for the most part attention has been concentrated upon their extraction from pressed apple pomace in a form likely to be of practical use in jam-making. This work has now reached a point where tests under commercial conditions are required, there being now practically no doubt about the possibility of the preparation of a suitable product in a form which will keep sound and retain the necessary "setting" qualities indefinitely.

The Utilisation of Cider Fruit in Food Production.—(*a*) *For Culinary Purposes.*—The sour or sharp class of cider apples presents no difficulty in this respect and has always been more or less drawn upon when ordinary market varieties have cropped poorly; but the sweet and bitter-sweet classes have always hitherto been regarded as comparatively worthless for the purpose, since the fruit would not cook properly, always remaining hard or only irregularly softened. The work on apple pectins has shown that this was due solely to deficiency of acid, the greater part of the "pectin" in these apples being in a form more or less insoluble in water—even after prolonged cooking at boiling point under ordinary atmospheric pressure—but readily soluble in dilute acid solutions. The addition of

decided upon) had become reasonably competent, and that, so far as possible, all local difficulties had been overcome and that a thorough demonstration in co-operation had been afforded.

Seven County Education Authorities adopted the scheme, with the result that there were conducted in 1917 nine co-operative cheese schools—2 in Cornwall, 1 in Wiltshire, 2 in Herefordshire, 1 in Montgomeryshire, 1 in Cheshire, 1 in Denbighshire, and 1 in Carnarvonshire. These schools worked throughout the season and were in every case successful. The producers supplying the several centres were fully satisfied with the returns obtained, and a true spirit of co-operation was engendered—as is shown by the fact that the demonstrations thus provided have resulted in the establishment of 8 new co-operative societies which are this year conducting duly registered co-operative dairy factories, some of them on a considerable scale.

In the autumn of 1917 the Committee on Production and Distribution of Milk recommended, in their Second Interim Report that steps should be taken to establish milk depots in districts where milk is produced in considerable quantities, but which through lack of organisation does not ordinarily become available for human consumption; and in order to facilitate the creation of such depots, they advised that the State should, if necessary, assist by lending a portion of the capital required.

The Board of Agriculture took action on this recommendation and obtained the sanction of His Majesty's Treasury to lend capital, on the basis of 6 per cent. interest, and repayable in a definite term of years. A general scheme was devised for the purpose, and the work of organising the depots was placed with the Agricultural Organisation Society.

Already 8 new depots have been established under this scheme and others are in process of formation. It is interesting to note that of these 8 depots, 5 are located where co-operative cheese schools, conducted in accordance with the Board's scheme, were held last season.

The work of the co-operative cheese schools last season has led to a greatly increased demand for such schools to be conducted this year. Already there are in operation 3 in Cornwall, 1 in Wiltshire, 1 in Berkshire, 2 in Herefordshire, 1 in Montgomeryshire, 1 in Cheshire, 1 in Flintshire, 2 in Denbighshire, 2 in Anglesey, 1 in Carnarvonshire, and 2 in Cumberland.

SEVERAL varieties of cheese can be made with buttermilk, either used alone or added in certain proportions to new milk or skim milk.

Buttermilk Cheese.

(1) To make a soft cheese from buttermilk alone the buttermilk must be heated to a very high temperature, since, being sour, it is not coagulated by rennet. In making this class of cheese the buttermilk must be *sour*, and the produce of thin cream, *i.e.*, cream yielding 3 lb. to 4 lb. of butter per gal. Should the cream have been taken off very thick by the cream separator, the caseous matter is found in suspension after heating and cannot be separated from the whey.

Buttermilk should be sour or acid, but as freshly made as possible. If sweet it may be necessary to use a starter to sour it before attempting to make it into cheese. In the small dairy buttermilk should be used for cheese-making as early as possible after it has been drawn from the churn, and it should be as pure—*i.e.*, mixed with as little rinsing water—as possible. The buttermilk should be placed in a clean pail and heated by immersion in a copper of hot water to about 160° Fahr. As the contents of the pail get hot, the curd will gradually separate. When a temperature of 160° Fahr. has been reached, the pail and its contents should be placed on one side and covered up for about an hour. This allows of the curd collecting into a mass. When this stage is reached the curd should be strained. This is done by spreading a piece of clean cloth over a frame provided with a rack or with a bottom made of galvanised wire netting of ½-in. mesh, with three ¾-in. slats nailed lengthwise underneath to clear the draining table. The curd should be scraped down occasionally and finally pressed with a board, weighted with a brick until the curd is dry enough to make up. It may then be salted to taste and made up into ¼-lb. or ½-lb. sizes, similar in shape to a cream cheese. Moulds for ¼-lb. sizes should be made of tinned copper sheeting, 3½ in. long, 2 in. wide and $1\frac{1}{8}$ in. deep. If kept cool and made from fresh buttermilk, the cheese should keep quite good for a week.

During the heating process the buttermilk should be gently stirred and, when ready for draining, it should be strained while quite hot. The finished cheese should be smooth and creamy.

(2) The second method is to mix two-thirds of buttermilk with one-third of new milk, bring to a temperature of 80° Fahr., add one dram of rennet to each 4 gal. of mixture, and stir in the rennet for a few seconds only. It should then be allowed to stand for one hour, when the curd should be dealt with as

described above. If the buttermilk has been used sour the curd will separate in a granular form. If fairly sweet it will form a firm coagulum, and if coagulation takes places the curd should be cut with a knife into ½-in. cubes at the end of an hour, and then ladled out into the cloth-covered draining rack. The cheese should be creamy in texture and free from grittiness.

(3) A pressed cheese may be made with separated milk mixed with not more than 20 per cent. of buttermilk. In this case the buttermilk should be used as fresh and as sweet as possible. The cheese should be made up as for Cheddar or for the Dorset skim-milk cheese. The addition of buttermilk in the manufacture of skim-milk cheese greatly improves the texture and flavour. In Leaflet No. 231, "Cheese-making for Small Holders," the manufacture of small pressed cheeses is described.

A very useful cheese can be made from mixed skim-milk and buttermilk in the proportions given above (as described under "Pressed Cheese No. 2," in the leaflet), only it requires a greater amount of milk to make a full-sized cheese. About 7 gal. of the mixture make on an average two cheeses of 2½ to 3 lb. in weight.

(*This note is also issued separately as Leaflet No.* 324.)

Preliminary Volume Table for Scots Pine.

THE table below has been compiled from felled trees measured by the Board's officers engaged on the collection of statistics as to the rate of growth of timber. The methods employed were similar to those used for constructing volume tables for the larch, which were published in the issue of this *Journal* for March, 1918.

Measurements of 540 trees were used in constructing the tables, viz. :—

30—40 ft. high	41 trees.
40—50 ,, ...	166 ,,
50—60 ,, ...	133 ,,
60—70 ,, ...	120 ,,
70—80 ,, ...	63 ,,
80—90 ,, ...	17 ,,
Total	540 trees.

The volumes given in the table are tape under bark. The proportion of bark in Scots pine trees varies from 6 to 16 per cent. of the volume of the unbarked tree with an average of rather less than 10 per cent. The under-bark measurements of the table must therefore be increased by a corresponding amount if over-bark volumes are required.

Volume Table for Scots Pine.

Quarter Girth at Breast Height (4 ft. 3 in.).	Total Height in Feet.					
	30–40	40–50	50–60	60–70	70–80	80–90
	Volume per Tree (cb. ft. Tape under bark).					
3 ..	0·64	—	—	—	—	—
¼ ..	0·80	—	—	—	—	—
½ ..	0·96	—	—	—	—	—
¾ ..	1·12	—	—	—	—	—
4 ..	1·29	1·85	—	—	—	—
¼ ..	1·46	2·09	—	—	—	—
½ ..	1·67	2·33	—	—	—	—
¾ ..	1·88	2·58	—	—	—	—
5 ..	2·10	2·88	—	—	—	—
¼ ..	2·33	3·20	—	—	—	—
½ ..	2·60	3·51	4·5	5·6	—	—
¾ ..	2·89	3·82	4·9	6·0	—	—
6 ..	3·20	4·14	5·3	6·5	—	—
¼ ..	3·50	4·46	5·8	7·0	—	—
½ ..	3·81	4·80	6·2	7·5	—	—
¾ ..	4·17	5·14	6·6	8·1	—	—
7 ..	4·50	5·48	7·1	8·6	—	—
¼ ..	—	5·85	7·6	9·2	—	—
½ ..	—	6·2	8·2	9·9	—	—
¾ ..	—	6·6	8·7	10·5	—	—
8 ..	—	7·0	9·2	11·1	13·1	—
¼ ..	—	7·4	9·8	11·8	13·9	—
½ ..	—	7·8	10·3	12·5	14·8	—
¾ ..	—	8·3	10·9	13·2	15·5	—
9 ..	—	8·8	11·5	13·9	16·3	—
¼ ..	—	9·3	12·0	14·6	17·2	—
½ ..	—	9·8	12·6	15·3	18·0	—
¾ ..	—	—	13·3	16·0	18·9	—
10 ..	—	—	13·9	16·8	19·8	—
¼ ..	—	—	14·5	17·5	20·7	—
½ ..	—	—	15·1	18·3	21·6	26·0
¾ ..	—	—	15·7	19·0	22·6	27·0
11 ..	—	—	16·4	19·8	23·6	28·0
¼ ..	—	—	17·0	20·6	24·5	29·0
½ ..	—	—	17·6	21·3	25·5	30·0
¾ ..	—	—	18·3	22·1	26·4	31·0
12 ..	—	—	19·0	23·0	27·4	32·0
¼ ..	—	—	19·7	23·8	28·3	33·1
½ ..	—	—	20·3	24·6	29·3	34·3
¾ ..	—	—	21·0	25·4	30·3	35·4
13 ..	—	—	21·8	26·3	31·3	36·4
¼ ..	—	—	22·6	27·2	32·3	37·5
½ ..	—	—	23·4	28·0	33·4	38·7
¾ ..	—	—	24·1	28·9	34·5	40·0
14 ..	—	—	24·9	29·8	35·6	41·2
¼ ..	—	—	25·7	30·8	36·7	42·4
½ ..	—	—	26·5	31·7	37·8	43·7
¾ ..	—	—	—	32·6	39·0	45·0
15 ..	—	—	—	33·5	40·2	46·4
¼ ..	—	—	—	34·5	41·4	47·8
½ ..	—	—	—	35·6	42·6	49·4
¾ ..	—	—	—	36·7	43·9	51·0
16 ..	—	—	—	37·8	45·3	52·8
¼ ..	—	—	—	—	46·7	54·6
½ ..	—	—	—	—	48·2	56·6
¾ ..	—	—	—	—	49·7	58·8
17 ..	—	—	—	—	51·2	61·0

Notes on Feeding Stuffs in July:
From the Animal Nutrition Institute, Cambridge University.

APPARENTLY the Feeding Stuffs Section of the Ministry of Food have directed manufacturers of concentrated feeding stuffs to store their summer output so that it may go to increase the supplies for next winter. In these circumstances, there is little to be said about supplies on the markets.

The policy is no doubt on the whole a wise one, but it must be admitted that occasions do arise on most farms when a small supply of concentrated food is really necessary, even when grass is abundant as it is at present. Every farmer should have in hand a small stock of bran for foaling mares and calving cows. It is believed that arrangements have been made to release a little cotton cake, which by the way does not keep well, for maintaining the milk supply in districts where the grass is liable to fail suddenly in case of even a short drought.

The present time also offers a favourable opportunity for reconsidering the system on which priority certificates are issued. The weakest point in the system is the shortness of the period which the certificates cover. The system was started last winter when the shortage of concentrated feeding stuffs was so acute that hand-to-mouth buying only a month ahead was the best that could be done. During the breathing space afforded by the present abundance of grass, however, it should be possible to amend the system. There seems to be no adequate reason why a farmer who presents a careful estimate of his next winter's needs, and is willing to sign a guarantee to store feeding stuffs until winter arrives, should not be granted a Priority Order, which would enable him to buy for his winter's needs. This would distribute transport more equally throughout the year and decrease the cost of the feeding stuffs to the farmer by the value of the rent, supervision and labour required for bulk storage.

Mr. Prothero has issued a warning to farmers as to the need of the greatest economy in the use of what remains of last year's hay crop.* Farmers must remember that they are not the only people who own livestock. From the national point of view, army and transport horses are as necessary as agricultural horses, and they, too, need hay. Any of last year's hay left over on 30th September will be reserved for town and army horses. The patriotic farmer will spare all he possibly can.

The same remarks apply also to wheat and oat straw.

* See p. 347 of this *Journal*.

TABLE.

Name of Feeding Stuff.	Fixed Price per ton. £	s.	d.	Number of Food Units per ton.	Price per Food Unit. s.	d.
Cakes, British Made—						
Linseed cake	19	0	0	111·2	3	5
Cotton seed cake	14	10	0	74·0	3	11
Ground nut, undecorticated	17	5	0	103·7	3	3½
„ decorticated	19	0	0	132·8	2	9½
Palm kernel cake	13	15	0	98·5	2	9½
Rape cake	14	0	0	106·3	2	7½
Copra or coconut cake	16	5	0	100·7	3	2½
Sesame cake	18	10	0	129·7	2	10
Soya cake	19	0	0	126·1	3	0
Meals, British Made—						
Extracted palm kernel meal	13	10	0	95·2	2	9½
„ rape meal	14	0	0	103·2	2	8½
„ soya meal	18	15	0	124·2	3	0
Cakes and Meals, Imported—						
Linseed cake (average)	19	10	0	115·1	3	5
Egyptian cotton seed cake	15	0	0	74·0	4	0
Decorticated cotton cake	19	15	0	120·4	3	3½
„ cotton seed meal	19	15	0	126·3	3	1½
Copra or coconut cake	17	10	0	100·7	3	6
Palm kernel cake	15	0	0	100·4	3	0
Rice meal (average)	16	5	0	84·4	3	10
Gluten feed	17	5	0	104·0	3	3½
Maize meal cake	17	5	0	85·5	4	0
Miller's Offals—						
Flour millers' offals	13	0	0	72·0	3	7½
Miscellaneous—						
Malt culms	13	5	0	87·7	3	0
Dried distillers' grains	15	5	0	98·6	3	1½
„ brewers' grains	14	5	0	77·2	3	8½
Compound Cakes—						
Containing not less than 7 per cent. oil and 20 per cent. protein	17	5	0	100·0	3	5½
Containing not less than 6 per cent. oil and 20 per cent. protein	17	0	0	95·0	3	7
Containing not less than 6 per cent. oil and 20 per cent. protein	16	17	6	90·0	3	8
Grain, Imported—						
Rye, damaged	15	4	0	89·6	3	5
Wheat, „	15	4	0	90·4	3	4
Maize, „	15	4	0	92·3	3	3½
Oats, „	13	8	0	75·0	3	7
Barley, „	13	16	0	82·4	3	4
Grain, Home Grown—						
Wheat, unfit for milling	15	5	0	90·4	3	4
Rye, „ „	15	5	0	89·6	3	5
Oats, „ „	13	15	0	75·0	3	8
Barley, „ „	13	16	0	82·4	3	4

This year's hay crop will be dealt with on the same lines as last year, except that the price of hay taken for the Army may be somewhat increased.

Since the appearance in these Notes of the last table of prices of feeding stuffs, a new Order* has appeared varying to a slight extent the maximum prices of cattle feeding stuffs. A new table, showing the present position with regard to feeding stuffs, is here given. The prices shown refer to quantities over two tons, and do not include transport charges and charges for bags. For quantities under two tons additional charges are allowed, varying from 5*s.* a ton for lots over 5 cwt., to 1*s.* 6*d.* a cwt. for smaller quantities.

The Utilisation of Couch-Grass.

IN continuation of the note on couch-grass rhizomes for feeding purposes which appeared on p. 1441 of the issue of this *Journal* for March last, experiments have recently been made in Leipzig-Lindenau on a large scale by Herr von Fehrentheil.† These experiments indicate that couch-grass (*Agropyrum repens*, Beauv.) is of substantial value as a food substitute in the existing shortage of feeding stuffs. According to the experiments couch-grass forms a valuable foodstuff for cattle and poultry. After the removal of any soil adhering to it the couch-grass is threshed and dried, and as "couch-hay" has quickly become a valued feeding-stuff among farmers. It is claimed that in feeding value it ranks with good meadow hay. It contains 10·37 per cent. crude protein, 4·93 per cent. digestible protein, and 1·36 per cent. fat. During the Thirty Years War, meal ground from the stolons of couch-grass was used to make a very palatable bread. Meal made from young nourishing grass, clover, lucerne, or certain weeds added to rye-meal has lately been employed with great success in the preparation of a really nourishing and delicious bread which will keep for a considerable length of time. The utilisation of couch-grass in these ways is strongly recommended by Strecker during the present shortage of foodstuffs.

Attention may also be called to an article on "The Composition and Agricultural Value of Couch and Couch Ashes," by John Hughes, F.I.C., which appeared in the *Journal of the Bath and West and Southern Counties Society*, Vol. VIII.

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* The Cattle Feeding Stuffs (Maximum Prices) Order, 1918 (Order No. 173, dated 7th February, 1918). See this *Journal*, March, 1918, p. 1474.

† From an article by Professor Dr. Strecker (Leipzig) in the *Illustrierte Landwirtschaftliche Zeitung*, October 20th, 1917.

(Fourth Series), 1898. The writer gives analyses of specimens of couch and samples of the soil which produced them, obtained from farms situated in three counties of England, and examines the results of his analyses. He shows the respective values of burnt couch and decayed couch heaped as a compost for manurial purposes, and also points out that this weed. when properly cleaned, and freed from adhering dirt, should prove a useful feeding material in times of scarcity.

Trials upon a small scale recently made in this country indicate that some difficulty may be experienced in getting cattle, sheep, or horses to consume the dried couch roots, but that pigs and poultry consume them freely.

Successful Co-operative Societies.

As instances of the great value of co-operation in agriculture the following accounts of the work of some farmers' co-operative societies (taken from the *A. O. S. News and Notes*, May, 1918), may be of interest :—

The Eastern Counties Farmers' Co-operative Association, Ltd.—This society, which has just held its annual meeting, has had a record year, both as regards membership and turnover. With a membership of 1.883 (610 new members being enrolled during the year) the turnover has been £701,000. A realised surplus of £15,660 has enabled the society to refund a bonus to members in respect of their purchases through the Corn and Machinery Department of 4*d.* in the £, to reserve for bad and doubtful debts £3,100, to place to special reserve £5,300, and to carry forward £10,935.

To cope with the expansion of business, the committee has secured additional premises in Princes Street, Ipswich, and has also taken over the store formerly occupied by the Tendring Hundred Farmers' Society at Weeley.

Allendale Farmers', Ltd.—This society had a turnover of £36,800 in its last year (exclusive of auction sales amounting to £13,300), being an increase of £9,000. Notwithstanding that the supply of feeding stuffs of all kinds has been limited, the amount of trade done in this department has exceeded that of any previous year. With a view to utilising to the best advantage the surplus milk in the summer months, a cheese plant was installed and a large quantity of "Allendale" Cheddar cheese manufactured. The year's trading resulted in a realised surplus of £1,242.

The Guildford and Mid-Surrey Farmers' Co-operative Association.—The tenth annual report of the Guildford and Mid-Surrey Farmers' Co-operative Association shows that the membership has steadily risen from 115, representing an acreage of 17,790, in 1908, to 338 in 1917, representing 52,510 acres. During the same period the nominal capital has increased from £331 to £1,312 ; the turnover from £9,535 to £33,090, and the realised surplus from £1 3*s.* 7*d.* to £905 16*s.* 6*d.*

During the past year the association has purchased new premises in Guildford. The purchase money was raised by subscriptions from members, and the amount required was over-subscribed. The members' interests are secured by a mortgage on the property. Further enterprise was shown by the association engaging the services of a competent

engineer, and a great deal of repair work to agricultural machinery has been carried out. This new development has been a striking success. Everything points to the continued prosperity of the association.

Littleton and Badsey Growers, Ltd.—To quote from the report of the Littleton and Badsey Growers, Ltd., "the past year has been an eventful one in the history of the society." Great progress has been made. The membership has risen to 144, and the turnover—£16,390—is considerably more than double the previous year's. This has resulted in a realised surplus of £1,439, of which £1,342 has been placed to reserve.

Brandsby Agricultural Trading Association, Ltd.—The half-yearly report and statement of accounts of the Brandsby Agricultural Trading Association, Ltd., show very satisfactory results. On a turnover of £33,870 a realised surplus of £741 has resulted, enabling the committee to declare a dividend of

1*s.* in the £ on members' store purchases.				
6*d.*	,,	,,	dairy sales.	
4*d.*	,,	,,	agricultural purchases.	
2*d.*	,,	,,	,,	sales.

The membership has increased from 327 to 352 during the half-year. The report strikes the right note in saying that "to obtain the greatest advantage of present developments farmers must combine in order to protect their own interests, and to receive a legitimate return for their industry, whilst ensuring to the people of this country food at fair and reasonable prices."

Melksham and District Poultry Society, Ltd.—Melksham and District Poultry Society, Ltd., has had a good year, dealing in nearly three-quarters of a million eggs, with a cash turnover of nearly £7,000, and a realised surplus of £207. The society has sub-depots at Atworth and Holt, and contemplates extending its operations to several of the neighbouring villages. The membership has steadily increased by 22 during the year.

Women's Work on the Land.

The Recruiting Movement.—The recruiting campaign in connection with the Women's Land Army is being pushed vigorously in the provinces as well as in London. Recent recruiting tours in East and West Sussex and in the North Country have proved very successful. Over 1,000 recruits were enrolled at Liverpool in three days; simultaneously Sheffield supplied 130, Leeds 97, Stafford 60, and Barnsley 50. In East Sussex 100 women signed on at Worthing, 70 at Bognor, and 66 at Horsham. Plymouth, during the week ended 24th May, 1918, reported 60 recruits. Appeals are being delivered in many provincial theatres and kinema halls nightly on the work of the Land Army and the names of recruits taken. The demand for skilled labour, for individual women as well as for gangs, is far beyond the available supply. Strong women desirous of joining the Land Army should apply to the new recruiting office, 135, Victoria Street, Westminster, S.W. 1, where full information as to terms of service, &c., will be supplied.

A Farmer's Tribute.—At many recent recruiting meetings of the Women's Land Army valuable testimony to the usefulness of woman labour on the farm has been offered by agriculturists who have employed such labour. A case in point occurred at one of the Oxford Street

meetings in London recently. A farmer in the crowd was saying such appreciative things about the Land Army that he was invited to address the meeting. He willingly did so, and, among other things, said he had a barrister's daughter, a doctor's daughter, and a professional singer, besides a number of other women of various classes, working with him. It did not matter to what class they belonged, he said, they had all done well. So well, in fact, had they done, he declared jocularly, that he had made £5 more profit on each pig this year than ever before. Calves, delicate from birth, had also been saved by the capable and careful handling of the women. On his farm four women and a boy had ploughed 57 acres of land most satisfactorily. In most districts, of course, the pre-war prejudice against the employment of women has disappeared under the stress of circumstances and as a result of actual experience in the employment of women.

The Women's Institutes.—Thirteen new institutes were reported during the third week in May. The Saltford (Somerset) Women's Institute has started the communal keeping of pigs. A Live-stock Committee has been chosen from the members of the Institute. Three depots have been arranged where waste from households, gardens, etc., is sent. The styes are rented from a man who undertakes to feed and look after the pigs. Any member of the Institute can be a member of the pig club by purchasing a 1*s.* share, and shares up to 5*s.* may be held by any member. Honorary members must take at least five shares. Boys who collect the waste are allowed to become shareholders by paying 3*d.* When pigs are killed, members may purchase the meat in proportion to their shares. A certain proportion of profits from sale will be put aside as a reserve fund, the remainder of the profit will be returned as bonuses to members, honorary or otherwise. This pig scheme has been drawn up on the advice of the Agricultural Organisation Society representative in Somerset.

Training for Land Women.—During the week ended 18th May, 1918, 20 new practice farms were sanctioned in connection with the Women's Land Army, making provision for the training of between 70 and 80 recruits. At the training centre at Drayton St. Leonards the women are given special facilities for acquiring a good all-round knowledge of horse work. There are 20 horses on the farm and they are looked after entirely by women. One woman, who went through the first course at the centre two months ago, is now acting as carter for the farmer who attends the centre, and is doing excellently. Among her other charges are 4 mules.

During the week ended 31st May, 1918, 28 new training centres were opened to accommodate 95 land women. Many new gang hostels have been sanctioned.

South Court House at Leighton Buzzard (Bucks) has been opened as a training centre for 50 women.

Some Work Done by Women.—Six new women tractor drivers have recently begun work in the Isle of Ely and the tractor representative reports most favourably upon them. A new tractor training centre for women has been started at Oxted. The work of the women on the Fordson tractors in the Holland area of Lincolnshire is "spoken highly of." The Chairman of the Labour Committee reported that the women had given great satisfaction, and other members of the Committee stated that their land had been ploughed "splendidly" by the women and the Fordson.

The Women's War Agricultural Committee for the Louth District have devised a good scheme for helping to preserve the fruit supplies. They had £15 in hand as their share of the surplus in the county from the sugar distribution. It was decided to spend this on two canners, one to be stationed at Louth, and the other to tour the villages. A trained operator will demonstrate the use of the canner. Every village should possess a canner for conserving food and a sprayer to prevent potato disease.

It is proposed to teach land women in the eastern counties how to "plash" hedges, so as to keep them continually employed during the winter. Others are to be taught threshing, or their services will be utilised in the turnip fields. It is suggested that "migratory groups of women may advantageously be organised."

The Brecon Committee have engaged four women, who have been working on the tractors, to cut thistles in the corn fields; and a number of unskilled women are to be employed under them.

In an efficiency test of 21 members of the Land Army held at Shrewsbury there were 13 entries for milking, 3 for ploughing, 5 for harrowing, and 9 for grooming and gearing. The highest point of efficiency was reached by one woman in ploughing and another in grooming. Several came as high as 99 per cent., 98 per cent., and 95 per cent., and none of the entries was lower than 75 per cent.

Notes on Allotments.

Allotment Progress.—The Food Production Department report that at Tarporley (Cheshire) every one of the 600 householders is cultivating either an allotment or garden this year for food production purposes. At Abergele and Pensarn 66 per cent. of the householders have food production plots. At Daventry (Northants) 572 out of 800 householders are cultivating allotments, all of which have been acquired by private agreement between the allotment holders and the landowners.

Among the larger towns that have done extremely well in the matter of allotments is Southampton, which has already provided 3,000 plots (242 acres) comprising practically all the available land conveniently situated. An effort, however, will be made to provide a further 300 allotments next season.

Three acres of land have been recommended for next-season allotments at Tythegstone Higher (Glam.). This land will probably be taken over immediately the hay crop has been harvested.

In many parts of the country landowners have shown an admirable spirit in relation to the provision of land for allotments by private treaty. An instance is reported by the Food Production Department from Haverhill (Suffolk) where 65½ acres of land have been provided by voluntary arrangement. This land has been cut up into 1,023 allotments; as there are only 1,056 houses in the town Haverhill must come very near to establishing a record in allotment holding. Some of the men to whom land has been allotted are on active service, and, in their absence, the allotments are being successfully carried on by their womenfolk.

Allotment Tenure.—In reply to inquiries, it is stated by the Food Production Department that war-time allotment holders who may receive notice to quit and be unable to arrange matters satisfactorily with the owner of the land they occupy should communicate with the Department Advice has been given in a number of cases and practical

assistance of various kinds in others. During the last week in May 11 allotment holders occupying an acre of land at West Molesey, and 17 allotment holders occupying 2½ acres at Deddington (Oxford), having received notices, appealed to the Department. An inspector was able in both cases to arrange for a continuance of the tenancy.

Fertilisers for Allotment Holders.—Allotment holders and small growers generally are informed that the Food Production Department is making arrangements with all "Approved" agents for the sale of fertilisers in the 1918-19 season to supply sulphate of ammonia, superphosphate, and basic slag in 14 lb., 28 lb., 56 lb., and 1 cwt. lots to meet the needs of allotment holders and small growers. It is hoped that this arrangement will obviate a difficulty experienced in some districts in the past season.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1d. *each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1 ; 37, *Peter Street, Manchester: and* 1, *St. Andrew's Crescent, Cardiff.*

THE following Interim Report of the Director-General of Food Production (for England and Wales) was issued for publication on 29th May :—

Results of Food Production Campaign, 1917-18.

It is now possible to give some results, to date, of the Government's efforts to increase home-grown supplies of corn and potatoes.

Increase in Acreage of Corn and Potatoes.

An official and compulsory census, obtained on 27th April, 1918, from occupiers of land in England and Wales, shows the total acreages *up to that date.* (See table on p. 338.)

Increase in Tillage Area.—Complete returns of the acreage of grass land ploughed are not yet available, but a compulsory census, taken on 11th March, 1918, showed that over 1,800,000 acres of "Permanent" grass in England and Wales had been broken up by that date, and it is estimated that a total addition of not less than 2,500,000 acres to the tillage area of England and Wales (as compared with 1916) has now been made.

If, as may be anticipated from the recent forecasts of the Boards of Agriculture for Scotland (300,000) and Ireland (1,500,000), the corresponding addition to the tillage area in those two countries will approximate to 1,800,000 acres, the total for the United Kingdom will be well over 4,000,000 acres.

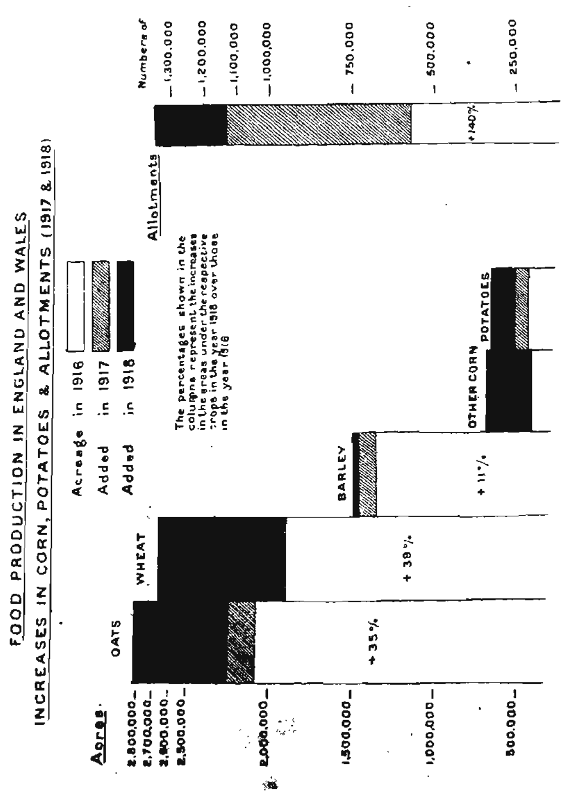
Home-grown Breadstuffs.—The foregoing figures indicate that the total acreage in the United Kingdom under wheat, barley and oats, in 1918, will be the highest ever recorded in the history of British agriculture. The acreage under potatoes will be the greatest since 1872. Particulars of other crops are not yet available.

It is, of course, not possible to foretell the quality of the coming harvest, but, speaking generally, the present condition of crops is very promising and gives reasonable hope of at least an average yield.

Proceeding upon this assumption, and further assuming that (after deducting seed and light corn) the whole of the wheat and barley crops,

one-fifth of the total oat crop, and one-quarter of the potato crc (*i.e.*, the surplus above normal consumption) could be made availab for bread-flour in case of need, it may be reckoned that the *Unit Kingdom* harvest of 1918 could provide 40 *weeks' supply* of bread-stuf for the entire population, at the present scale of consumption and c the existing basis of milling.

Feeding Stuffs.—The *English and Welsh* harvests would furth provide concentrated feeding-stuffs for animals (in excess of the norm

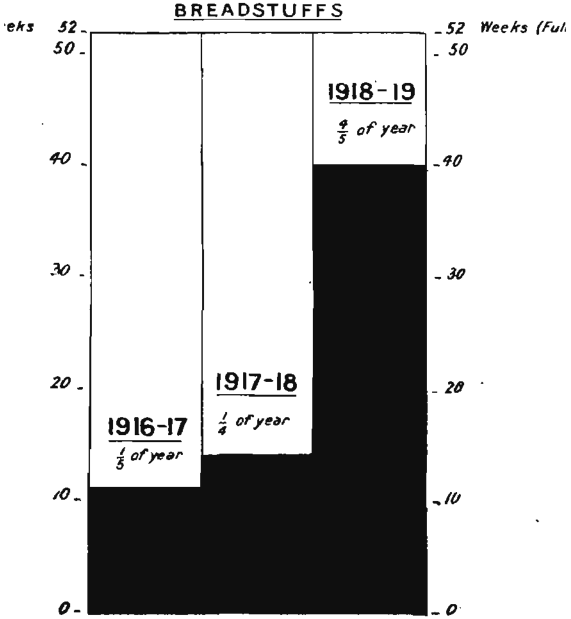


home production of oats reserved for this purpose) to the amount of some 500,000 tons, besides additional oat straw equivalent to at least 350,000 tons of hay.

Saving of Tonnage.—Reckoned in tonnage, the *net* saving in shipping resulting from the increased production of corn and potatoes, in England and Wales alone, should amount in the coming year to 1,500,000 tons.

HOME-GROWN BREADSTUFFS.

led portions show number of Weeks during which the United Kingdom
; been or will be Self-supporting in the years 1916-17, 1917-18, and 1918-19.



agram is calculated upon the different standards of milling which
were actually in force in each of the years named

FOOD PRODUCTION DEPARTME
May 1918

Allotments.—The foregoing figures relate only to holdings of one acre and upwards and take no account of the increased produce from allotments and gardens. These, however, contribute very largely to the supply of home-grown food. The increase in the number of allotments alone, since 1916, is not less than 800,000 in England and Wales, or 140 per cent.

The additional weight of foodstuffs produced by this expansion may be reckoned at not less than 800,000 tons above the normal.

CORN AND POTATOES.

(*England and Wales only.*)

Crop.	Acres.	Increase Over 1916.		Remarks.
		Acres.	Percentage.	
Wheat	2,665,000	752,000	+ 39	Highest recorded since 1882.
Barley	1,490,000	58,000	+ 11	——
Oats	2,820,000	735,000	+ 35	Highest on record by 20 per cent.
Rye, Dredge Corn, and Pulse ..	682,000	280,000	+ 69	——
Potatoes	645,000*	217,000	+ 50	Highest on record by 27 per cent.
Total acreage of *Corn and Potatoes* (England and Wales) ..	8,302,000	+2,042,000		

* Ministry of Food Census.

Conclusion.—These results (so far as Great Britain is concerned) have been achieved under exceptional difficulties created by shortage of labour. In England and Wales alone there are over 200,000 fewer male labourers on the land to-day than in the year before the War, after crediting all military and prisoner labour furnished by the Government. This fact, by itself, is a sufficient proof of the energy, resource, and patriotism with which all sections of the agricultural community have devoted themselves to the service of their country.

N.B.—The diagrams on pp. 336-7 will help to illustrate the main points in the Memorandum.

THE following Letter (No. C.L. 26/H.), dated 21st May, 1918, has been addressed to Horticultural Sub-Committees by the Food Production Department of the Board :—

Rabbit Breeding Scheme: Circular Letter.

SIR,—I am directed to refer to the Circular Letter issued by this Department on the 2nd May, and to say that the Department, in order to encourage the more general keeping of rabbits, has elaborated a scheme which it is hoped will be adopted throughout the country.

As is generally known, the chief obstacle to the wide extension of rabbit keeping at the present time lies in the fact that suitable utility breeding stock is scarce, difficult to obtain, and costly. An essential feature of the scheme which is being put forward by the Department consists in the adoption of measures to secure and to increase the breeding stocks of suitable strains, and to put those stocks to the best use for the purposes of raising rabbits which may be purchased by all those who wish to keep rabbits for table purposes.

It is believed that this end will be secured by the establishment of breeding centres, and the National Utility Rabbit Association, which has been formed at the instance of the Department, is now engaged in establishing a central breeding station in London, and is also prepared to lend its assistance towards setting up similar breeding stations (called "100-Doe Centres") in different parts of the country.

Each breeding station established in this way will be required to give an undertaking to maintain a prescribed number of breeding does in the station, and to supply a prescribed percentage of young rabbits to clubs affiliated to the Association, and also to provide individuals at a price agreed upon between the breeding station and the National Utility Rabbit Association. Needless to say, the Department will use every means to secure that the prices thus agreed upon are such as to make rabbit keeping possible for any section of the community. The breeding station will also be required to supply, so far as the existing stocks will allow, breeding does to authorised small breeding centres (called "20-Doe Centres"), to be established under the auspices of the Association and in relation with the larger 100-Doe Centres.

It should be clearly understood that the present shortage of breeding does cannot be remedied in the immediate future, and that it will therefore be impossible for the breeding centres to supply, on any considerable scale, does in young to private individuals. The whole object of the scheme is to make good the present shortage of supply of suitable breeding stock by assembling in centres, and keeping strictly and only for breeding purposes, does of suitable strains and at present available.

Whereas, therefore, it will not be possible before some months have elapsed to meet demands which are likely to arise for supplies of does in young, it will be possible, at all events, in a large measure to meet the demand which exists, and will increase, for young rabbits for keeping for both table and breeding purposes.

It is proposed that, in order that the details of the scheme may be outlined to the Committee, an officer of the Department should attend your Committee at an early date, and I shall be greatly obliged if you will indicate to me what are the earliest alternative days on which it would be possible for you to summon your Committee, in order that the Department's proposals may be placed before them.

I should add that both this Department and the National Utility Rabbit Association are anxious that the scheme for largely increasing the numbers of rabbits kept in the country shall have the advantage of the active assistance of the Horticultural Sub-Committee.

I am, etc.,
(Signed) G. F. MIDDLETON,
For Controller of Horticulture.

The National Rabbit Scheme.

A NATIONAL rabbit-breeding scheme has been started by the National Utility Rabbit Association and the Food Production Department. The Association comprises the leading rabbit breeders and rabbit keepers of the country. It is establishing a central breeding station and stud exchange at Mile Street, Vauxhall, S.E., where 1,000 does will be kept. The primary object of the Association is to build up as quickly as possible a large supply of the best pedigree stock, which will be sent out to district breeding centres to be set up throughout the country. These, in their turn, will supply breeding stock to smaller stations, formed in association with the district centres. Each of the larger district centres will have 100 breeding does; the smaller stations will have 20. It is hoped that all allotment societies, food production societies, and women's institutes, and many factories, munition works, schools, camps, and so on, will form rabbit clubs in affiliation with the Association. The clubs will, in the majority of cases no doubt, manage the breeding centres. Most of the existing rabbit clubs have signified their willingness to affiliate to the new Association.

The Association will work in close co-operation with the Horticultural Sub-Committees of the Agricultural Executive Committees of the counties, and it is expected that the Horticultural District and Village Committees will play an active part in the development of the rabbit scheme.

The first club started in London under the auspices of the new National Association is at the Royal Mews, Buckingham Palace. About £100 has been subscribed; there are 90 members or employees of the Royal Household in the club; 12 breeding does have been installed—these represent all the best utility types of rabbit and have been collected from the chief breeders of the country—and shortly 50 does and 10 bucks will be installed. It is hoped that the example of the Royal Family in assisting in the establishment of this club will be followed by the proprietors of all the leading mews in London.

Full particulars as to the Association, as to the best breeds to keep, as to war-time rations for rabbits, etc., can be obtained on application to the Food Production Department, 72, Victoria Street, S.W. 1.

Supply of Harvest Carts and Lorries.

THE following Memorandum (No. C.L. 161/M. 1), dated 18th May, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

It will not be possible to supply in time for the hay harvest more than a small number of the carts and lorries referred to in Circular No. 139/M. 1.*

The Department do not consider it practicable to arrange for the manufacture of raves and ladders to be distributed from central points for fitting to carts and lorries already in the counties.

Committees requiring carts and lorries for the hay harvest should, therefore, arrange locally for raves and ladders to be fitted to the carts and lorries which have already been supplied. The maximum cost to the Department of raves and ladders is for carts £4 10s., and for lorries

* See this *Journal*, May, 1918, p. 206.

£6 10s. a set, and this amount must not be exceeded by Committees without reference to this Department. Every effort should be made to obtain raves and ladders at less than these figures.

If a permit for timber is required forms should be obtained from the Timber Controller, Caxton House, Westminster, S.W. 1, and should be properly filled in, as directed, and then sent to the Department for the addition of a recommendation to Form "C." The forms will then be forwarded by the Department to the Timber Controller.

If a priority certificate for wrought iron or mild steel is wanted, full particulars giving sections and quantities and supplying firms should be sent to the Department, who will then apply to the Ministry of Munitions.

THE following Memorandum (No. C. L. 184/M. 2), dated 5th June, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Labour Employed on Steam Tackle.

With reference to C. L. 79/L. 1, the attention of Agricultural Executive Committees is drawn to the importance of the retention of labour engaged in connection with steam tackle. Besides the work which is normally undertaken, a large amount of land was broken up by means of steam tackle last season, and steam tackle will be of the greatest importance during the coming ploughing season. The labour employed is highly skilled and at present irreplaceable, and any further reduction in the number of men engaged would entail the laying up of sets of tackle, a position which the Department is most anxious to avoid.

When the question of the inclusion of such men in List A (1) or List A (2) comes before a Committee, it is desirable that, if the set of tackle upon which a man is employed is energetically and efficiently worked and the man himself is an efficient workman, very careful consideration should be given to the case before the man is released for military service.

THE following Memorandum (No. C. L. 80/L. 1), dated 3rd June, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Soldier Labour.

In view of the large number of soldiers now engaged on agricultural work, it is increasingly important that as much supervision as possible should be exercised over the work which they are called upon to perform. Except with special authority these men should be engaged on farm or market-garden work, and it is the duty of the County Agricultural Executive Committees to allot them to the farms on which their services are most urgently required and when other sources of labour (women, prisoners, etc.) are not available.

Steps must also be taken, in the manner best suited to each locality, for periodical inquiries to be made either by a personal visit by an officer or member of the district committee or by reference to the police as to whether the soldiers are employed at the place and at the work to which they were sent out. In this matter committees should seek the co-operation of the Commandant of the distribution centre, and in any cases where inquiry shows that the soldier should be withdrawn the Commandant should be asked to take the necessary action at once.

Commandants of agricultural distribution centres sometimes experience difficulty in getting about the country to visit farms and generally attend to the numerous questions arising in connection with soldier labour employed in agriculture. The Department suggest that whenever it is possible assistance might be given to Commandants in this matter by combining visits with those made by officers of your committees.

THE following Memorandum (No. C. L. 81/L. 1), dated 3rd June, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Civilian Prisoners of War.

The Department are informed by the Home Office that there are still available a number of able-bodied interned aliens accustomed to manual work who can be released for employment on the land under the conditions laid down in the Department's leaflet (F.P. 121 L. 1), a copy of which is enclosed.* Many of these men claim to have had experience of agricultural work, whilst some are mechanics who claim knowledge of motor implements, steam-plough tackle, traction engines, *etc.* Others are fitters and a few are blacksmiths.

The attention of farmers in the county should again be drawn to the possibility of obtaining useful labour from this source.

ACCORDING to the foregoing Memorandum (No. C. L. 81/L. 1), it is expected that a small number of Danish agricultural workmen will shortly be available for employment in this country. These men are being recruited by the Ministry of Labour, and every care is taken to obtain men who are definitely qualified to undertake agricultural work. While it is not advisable, in view of the small number of these men who are likely to come to this country, to advertise this labour widely, Committees will, no doubt, take steps to get some of the men placed in the county on work connected with food production. Applications from farmers should be forwarded to the Minstry of Labour, Employment Department, Queen Anne's Chambers, Westminster, S.W. 1, and should be made on a form, a copy of which is enclosed.*

Danish Labour.

THE following Memorandum (No. C.L. 76/L. 1), dated 17th May, 1918, has been addressed to District Commissioners and Secretaries of Agricultural Executive Committees by the Food Production Department of the Board :—

Exemption of Men Employed in Connection with Agricultural Tractors, Steam Ploughs and Threshing Machines.

Telegrams were issued by the Ministry of National Service on the 27th ultimo and 2nd instant, to the effect that it was not intended that the makers, erectors, or repairers of agricultural implements, tractors, steam ploughs, or threshing machines, and attendants, drivers, or mechanics employed thereon, should be decertified by the Withdrawal Order of 9th April, Form R. 49. Agricultural Executive Committees were notified accordingly by this Department.

The Ministry have now issued instructions by telegram 1976/R.1 of 13th May, that recruiting authorities may use their discretion as to the

posting of the classes of men of these occupations, whether within the ages covered by Royal Proclamation of 20th April or not, bearing in mind the need for men for the Army and the importance of food production. Recruiting authorities can, therefore, now suspend the calling up of men of the ages and grades or medical categories affected, with a view to allowing time for substitution in urgent cases if referred *by Executive Committees to local recruiting authorities direct for* submission to them if required to Regions. Committees should clearly understand that only very urgent cases may be submitted, and also that the discretion to be exercised by recruiting authorities applies to the men concerned who were regarded as being affected by the Withdrawal Order of the 9th of April and those who are concerned by the Proclamation of the 20th April.

This consideration is important, as some Committees have thought that the telegrams of the 27th of April and the 2nd of May refer to cases covered by the Proclamation, whereas they apply only to cases covered by the Withdrawal Order of 9th April. These Committees have accordingly omitted to submit under paragraph 5 of this Departments's Circular Letter of the 26th ultimo (66/L. 1)* cases which might have been allowed to go to the Appeal Tribunal. Provision is now made by the new instructions referred to herein, by which any omission in these occupations only may be met.

THE following Notice was issued by the Food Production Department of the Board towards the end of May :—

Binder Twine.

The Food Production Department of the Board has made arrangements for the supply of additional quantities of binder twine to meet the needs of the coming harvest. The present price to farmers is 120*s*. per cwt., delivered to farmer's nearest railway station, or taken from dealer's or merchant's local store. Any dealers or merchants who are unable to obtain sufficient twine to meet current orders from the makers from whom they usually buy should make application to the Food Production Department, 72, Victoria Street, London, S.W. 1, without delay.

THE following Memorandum (No. C.L. 49/C. 1), dated 18th May, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Damages to Crops and Fences.

In consequence of representations that have been received from various parts of the country to the effect that, owing to the large extension of the arable cultivation, the existing legal provisions are not sufficiently effective to prevent damage to growing crops, the Board of Agriculture have (with the concurrence of the Home Office) obtained an amendment to the Defence of the Realm Regulations by which it has been made a summary offence against those Regulations to do such damage.

Any person who, without lawful authority or excuse, damages any growing crops or any hedge or fence on any agricultural land is liable to a fine of £100, or six months' imprisonment with or without hard labour, or both. The offence is triable by Court of Summary Juris-

diction. A prosecution can only be instituted by an officer of police, or by a person authorised by the Government Department concerned.

It is not necessary that there should be any notice displayed on the land in order to prove the offence, where damage of this kind has been committed.

If the damage is done by a crowd (as frequently happens when aeroplanes alight on cultivated land) any member of the crowd is deemed to have caused the damage unless he proves the contrary.

Trespass without doing actual damage to crops or fences is punishable only in respect of allotments or field gardens, and only where a notice giving the effect of Regulation 2N is conspicuously displayed on the land.

The full text of Regulation 2N, as now amended, is as follows:—

2N. If any person without lawful authority or excuse damages any growing crops or any hedge or fence on any agricultural land, or if any person without lawful authority or excuse enters or remains on any land

(*a*) of which a Government Department or any body or person authorised by a Government Department is in possession under the powers conferred by Regulation 2L; or

(*b*) which has been provided for use as allotments or field gardens under that Regulation or otherwise, and on which there are growing crops,

and on which there is conspicuously displayed notice of this provision, he shall be guilty of a summary offence against these Regulations.

Where any such damage as aforesaid is caused by the assembly of a number of persons any one of such persons shall be deemed to have caused such damage unless he proves the contrary.

THE following Notice was issued by the Food Production Department in May:—

Destruction of Farm Pests.

Some interesting particulars about the destruction of rats, rooks, house sparrows, and other farm pests have been sent in to the Food Production Department recently. They show that where the matter is taken in hand systematically any reasonable expenditure in this direction is an excellent investment. For example, in Hertfordshire 53,632 rats, 33,990 sparrows, and 14,581 sparrows' eggs are said to have been destroyed in a twelvemonth at a cost of only £261 11*s*. Assuming the accuracy of the estimate that rats alone cause about £40,000,000 worth of damage to food-stuffs in this country annually, and accepting the very modest sum of 1*s*. per week as the cost of feeding a farm rat, it will be seen that the total bonus money paid in Hertfordshire must have been saved many times over on the rat account alone, and the measures taken must be regarded as extremely economical.

THE following Memorandum (No. 48/C. 2), dated 17th May, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Cartridges for the Destruction of Farm Pests.

Some doubt appears to exist as to the procedure relative to the supply of cartridges for county pigeon shoots and the destruction of vermin.

A Committee should order from a cartridge retailer, in the form S.C. 3, issued by the Ministry of Food, a stated number of cartridges,

which, however, will not be delivered to the Committee but will be retained by the retailer who will supply them to persons producing the Committee's authority to purchase. A Committee should not place orders for more than 1,000 cartridges in the hands of the same retailer until he has sent details of the sales, against the Committee's permits, of the supply placed with him for the Committee's account. When this supply is exhausted the Committee should inform the Ministry of Food how many shooters have been supplied with cartridges, and give to the retailer a further order in the form S.C. 3.

All retailers are receiving stocks monthly proportionate to their sales in 1916, and it is important that the Committee should grant an authority to purchase only where they consider that the applicant is unable to obtain cartridges in the ordinary way from his dealer.

THE following Letter (C.L. 24/H.), dated 16th May, 1918, has been addressed to Horticultural Sub-Committees by the Food Production Department of the Board :—

Reimbursement of Marketing Societies.

SIR,—I am directed to transmit herewith, for the information of your Committee, a copy of a Memorandum showing the conditions under which the Department are prepared to reimburse the County Marketing Society formed by or under the control of a Marketing Executive or the Horticultural Sub-Committee to the extent of a sum not exceeding £250 in the event of the accounts of the first year's working showing a loss to that extent. I am to point out that the Department have agreed to pay a salary of £100 a year to the secretary of a Horticultural Sub-Committee, provided that he also acts as secretary of the Marketing Executive.

In several counties the services of an officer of the education staff of the County Council have been lent to the Horticultural Sub-Committee, and in some cases this officer is acting as secretary. In such cases the Department are of opinion that some special arrangements should be made for the Marketing Executive, and it ought to be possible to find in nearly every county an honorary secretary who would be prepared to do the work, provided adequate clerical assistance could be given.

The Department wish to make it quite clear that as the work of the Marketing Executive involves the raising of capital and the formation of a co-operative society, any expenses incurred by the society must be met from the society's own funds and not from grants or funds of the Agricultural Executive Committee.

I am to suggest that in any county where a co-operative society is formed for marketing the Horticultural Sub-Committee should name its society the "(name of county) Fruit and Vegetable Society, Ltd.," and so ensure uniformity throughout the country.

I am, etc.,
(Signed) G. F. MIDDLETON,
For Controller of Horticulture.

ENCLOSURE.

Memorandum of the conditions under which the Food Production Department are prepared to reimburse any marketing society formed by, or under the control of, the Marketing Executive or the Horticultural Sub-Committee of an Agricultural Executive Committee, to the extent of a sum not exceeding

£250 in the event of the accounts of the first year's working showing a loss to that extent.

1. The Horticultural Sub-Committee must form a Marketing Executive on the lines indicated in the Department's Leaflet (F. P. 209/H).*

2. The Marketing Executive must form a co-operative society with a corporate existence.

3. The co-operative society so formed must raise sufficient capital to ensure the proper working of the society, according to the needs of the county.

4. The co-operative society must develop at least one central and three district or village depots.

5. The co-operative society, before starting business, must submit its rules in draft, and its proposed scheme of working to the Food Production Department for approval.

6. The co-operative society must appoint a market manager, but before actually making the appointment it must submit his application and all relevant papers, together with the salary proposed, to the Food Production Department for approval. The market manager must have a practical knowledge of the fruit and market garden produce trade, both wholesale and retail.

7. The co-operative society must submit to the Food Production Department a detailed statement of the number of paid officials, with their salaries, whom the society propose to employ at their headquarters, and also at the various depots. The Department would notify the society of any such appointments as they considered to be unnecessary, and if these appointments were still made by the society they would not be taken into account in determining if a loss had been incurred by the society.

8. The society must report any proposed expenditure on transport to the Department.

9. The society, through the Marketing Executive or the Horticultural Sub-Committee, must render to the Department a quarterly statement of the receipts and expenditure of the society. The statement should be signed by the secretary of the society, and countersigned by the chairman of the Horticultural Sub-Committee.

10. At the close of the first year of working a trading account for the year should be prepared and submitted to the Department, together with a claim of any loss shown by the account to have been incurred in the year's working. This account should be signed and countersigned, as instructed in the preceding paragraph, and should be audited by the auditor of the Agricultural Executive Committee.

Order Amending the Grain (Prices) Order, 1917.

AN Order (No. 516), dated 6th May, 1918, amending the Grain (Prices) Order, 1917, has been made by the Food Controller to the effect that :—

1. Clause 9 of the Principal Order† is hereby revoked as from the 15th May, 1918, and such Order as amended by an Order of the Food Controller dated the 5th April, 1918,‡ *shall accordingly apply to grain suitable for seed.*

Order Amending the Damaged Grain, Seeds and Pulse (Prices) Order, 1917.

AN Order (No. 519), dated 10th May, 1918, has been made by the Food Controller amending the Damaged Grain, Seeds and Pulse (Prices) Order, 1917,§ to the effect that :—

1. The following words shall be inserted at the end of Clause 1 of the Principal Order: "Provided that in the application of this Order to maize, it shall apply only to maize which has been damaged by water."

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* Not here printed : to be obtained post free from the Food Production Department, 72, Victoria Street, London, S.W. 1.

† Order No. 820 of 1917. See this *Journal*, September, 1917, p. 673.

‡ " " 401 " 1918. " " May, 1918, p. 237.

§ " " 1174 " 1917. " " December, 1917, p. 1026.

2. Clause 2 (*b*) of the Principal Order shall be revoked as at the 20th May, 1918, and the following Clause shall be substituted therefor:—

"(*b*) On the occasion of the sale of any such article (unless it has been damaged by water) which has been re-conditioned or rendered more merchantable by kiln-drying or other like treatment, the maximum price shall be the price applicable according to the foregoing table together with the addition of a sum per quarter not exceeding the customary reasonable charge for such mechanical treatment. On the occasion of sale of any such article which has been damaged by water and which has been re-conditioned or rendered more merchantable by kiln-drying or other like treatment, the maximum price shall be in the case of Food Wheat 65*s*. per qr. of 480 lb., and in every other case the price applicable according to the foregoing table. When any article mentioned in the foregoing table has been mechanically treated by clipping, splitting, kibbling, bruising or grinding, or any other like method, the maximum price shall be the price applicable according to the foregoing table and provisions, together with the addition of a sum per qr. not exceeding the customary reasonable charge for such mechanical treatment."

THE following Notice was issued by the Board on 24th May:—

The 1917 Hay Crop.

The President of the Board of Agriculture and Fisheries desires to impress on farmers the necessity for the exercise of strict economy in the use of that portion of the 1917 hay crop which remains.

It is essential that supplies required by horses engaged on transport work of urgent national importance should be maintained, and while "farmers and stock breeders are authorised to use a reasonable quantity of hay or oat or wheat straw in their possession for consumption by stock in their possession or control" yet the President agrees with the proposal of the Forage Department of the War Office that farmers cannot be allowed, as a rule, to retain in their possession any portion of the 1917 crop beyond the 30th September next. In exceptional cases where a farmer can prove that it is in the national interest that he should be allowed to retain any portion of the 1917 crop beyond that date, it is open to him to refer his case to the County Farm Produce Committee concerned, whose decision will be final and binding on all parties.

Base Prices for Potatoes.

The Food Controller, in consultation with the three Departments of Agriculture, has fixed the following base prices* under the Potatoes Order (No. 2), 1917† for sound ware potatoes delivered by the grower on or after 15th May, 1918:—

	£	s.	d.	
(*a*) England and Wales	7	0	0	per ton.
(*b*) Scotland.				
(i.) Dumbartonshire, Stirlingshire, Linlithgowshire, Edinburgh, Haddington, and all counties south thereof (*excluding the county of Bute*) ..	6	10	0	"
(ii.) Argyllshire, Perthshire, Forfarshire, Kincardineshire, Fife, Clackmannan and Kinross	6	0	0	"
(iii.) The rest of Scotland including the county of Bute	5	10	0	"
(*c*) Ireland	5	0	0	"

* See Order No. 534, dated 15th May, 1918.

† Printed in this *Journal*, December, 1917, p. 1001.

Note.—The base price for England and Wales is the same as the guaranteed minimum price after 14th May, and no subsidy may be claimed by English or Welsh growers in respect of potatoes delivered after that date.

Contracts subsisting on 15th May for the sale of potatoes will be cancelled on that date in so far as potatoes not delivered before that date are concerned.

The restriction on the sale of "King Edward" ware potatoes grown on warp, silt, limestone and marshland in certain counties is now removed. (*National Food Journal*, 22nd May, 1918.)

Charges for Early Potatoes.

THE following maximum retail prices have been prescribed for early potatoes of the 1918 crop sold in Great Britain:—*

From 20th to 31st May	4*d.* per lb.
,, 1st to 15th June	3½*d.* ,,
,, 16th to 30th June	3*d.* ,,
,, 1st to 15th July	2½*d.* ,,
,, 16th to 31st July	2*d.* ,,

These prices apply both to imported and to home-grown potatoes. Subject to the operation of these prices the wholesale price of early potatoes up to the end of July will be unrestricted. (*National Food Journal*, 22nd May, 1918.)

AN Order (No. 518), dated the 8th May, 1918, has been made by the Food Controller to the effect that:—

The Potatoes Order (No. 2), 1917, Amendment Order, 1918.

1. In Clause 2 of the Principal Order,† the words "prescribed sum" shall be substituted for the words "sum of £6," and the following clause shall be added at the end of such clause:—

"The prescribed sum shall as respects potatoes delivered before the 15th April, 1918, be £6, and as respects potatoes delivered between the 15th April, 1918, and 14th May, 1918, inclusive, be £6 10*s.*, and as respects potatoes delivered after the 14th May, 1918, be £7."

2. The following Clause shall be inserted after Clause 2 of the Principal Order:—

"2A. Where, after the 31st March, 1918, a grower of potatoes dresses his clamped potatoes and riddles the same so as to extract therefrom the seed potatoes and re-clamps his ware potatoes, he may make application for payment of a sum of 10*s.* in respect of each ton of such re-clamped potatoes; provided that a claim shall not be made or allowed under this Clause in respect of a greater quantity of ware potatoes than a quantity which bears the same proportion to the total quantity of ware potatoes extracted from the original clamp as the quantity of seed potatoes extracted and planted or sold for planting by the grower bears to the total quantity of seed potatoes so extracted."

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* The Early Potatoes (Prices) Order, 1918: Order No. 554, dated 21st May, 1918.

† Order No. 1185 of 1917. See this *Journal*, December, 1917, p. 1001.

3. The following words shall be inserted at the end of Clause 5 of the Principal Order: "or (iii.) shall have failed to make any return required by or under the authority of the Food Controller or shall have made any false statement in any such return."

The Potatoes (Registration of Wholesale Dealers) Order, 1918.

AN Order (No. 555), dated 22nd May, 1918, has been made by the Food Controller to the effect that:—

1. All certificates of registration heretofore granted under the Potatoes Order, 1917, by a Food Control Committee in Great Britain to any person as a wholesale dealer shall stand revoked as at 1st June, 1918, so far as the same relate to eating potatoes, and as at the 1st July, 1918, so far as the same relate to seed potatoes.

2. A certificate of registration as a wholesale dealer in potatoes granted or to be granted by the Food Control Committee for Ireland shall not authorise any dealings by such dealer outside Ireland in eating potatoes on or after the 1st June, 1918, or in seed potatoes on or after the 1st July, 1918.

3. Applications for new certificates of registration in Great Britain under the Potatoes Order, 1917, may be made by such persons and in such manner as the Food Controller may from time to time direct. All such certificates shall be subject to such conditions as may be endorsed thereon or as the Food Controller may from time to time prescribe, and shall be revocable by the Food Controller at any time.

4. The holder of any certificate of registration as a wholesale dealer in potatoes shall comply with such directions as to his dealings in potatoes as may from time to time be given by the Food Controller or under his authority.

5. After the date of this Order a Food Control Committee in Great Britain shall not grant to any person a certificate of registration as a wholesale dealer in potatoes.

Potatoes: Questions in Parliament.

Mr. Watt: To whom should farmers apply in order to get from the Government the price of £7 10*s*. per ton for their potatoes in stock after 15th May?—**Mr. Parker:** The Government have not indicated any intention of taking over stocks of potatoes from growers on 15th May at £7 10*s*. per ton; but, as announced on 29th March, the Food Controller will be prepared on and after 15th May to purchase all sound ware potatoes in lots of 4 tons at £7 per ton f.o.r., for which the grower cannot otherwise find a market. The returns of stocks just received by the Ministry of Food do not suggest that there will be any substantial surplus of ware potatoes in Great Britain which the growers will be unable to dispose of through the usual trade channels during May and June. If, however, after 14th May any grower has stocks on hand which he sees no prospect of being able to sell for delivery during May or June he should send particulars to the Director of Vegetable Supplies, 100, Cromwell Road, London, S.W. 7, giving the address of his farm and the nearest railway station, together with the names and addresses of any dealers to whom he has unsuccessfully offered to sell his ware potatoes. (7th May.)

Major Wheler: In view of the scarcity of feeding stuffs for pigs, will the Ministry authorise the sale of small seed potatoes for such a purpose after the requirements of this season's acreage for planting have been met?—**Mr. Clynes:** Any potatoes which are not ware potatoes fit for human consumption may be sold for feeding to pigs withont a licence. (9th May.)

Mr. Watt: Is it the intention of the Ministry to pay to farmers possessed of ware potatoes, from 15th May to end of June, the price of £7 per ton f.o.r. in 4-ton lots if they have failed to find purchasers at that price, or are they expected to offer these potatoes to dealers at lower prices than £7 per ton; and, if the latter, is the difference to be made up by the Food Department?—**Mr. Clynes:** Farmers who are able to satisfy the Ministry of Food on and after 15th May that they are unable to find purchasers for their potatoes in lots of 4 tons or more at or above the base price then ruling will be entitled to receive payment for their potatoes from the Ministry of Food at the rate of £7 per ton. If potatoes are sold to dealers at a figure which is below £7 per ton, but not below the current base price, the seller can claim the difference from the Ministry of Food. (9th May.) (*National Food Journal*, 22nd May, 1918.)

THE following Notice was published by the Food Production Department of the Board early in June:—

Vegetable Marrows for Jam Making: Appeal for Increased Planting.

Estimates made by the Food Production Department indicate that this year's fruit crops will be insufficient to supply the jam factories with the fruit required for jam-making purposes. In view of the great importance of sufficient supplies of jam being available for use by the Navy and Army, and by the civilian population, the Department is appealing to all cultivators to plant immediately and on as large a scale as possible, vegetable marrows for supplementing the fruit supplies available for the jam factories.

The Department is authorised by the Sugar Commission to announce that there is no prospect of any further allowance of sugar becoming available for the honsehold making of jam from vegetable marrows. Therefore the vegetable marrows grown in response to this appeal should be either sold to jam-making factories or stored for use during the winter.

The Department is informed by the Ministry of Food that thousands of tons of ripened vegetable marrows can be utilised during the coming season by the recognised jam manufacturers.

A leaflet on the cultivation of the vegetable marrow may be obtained free on application to the Food Production Department, 72, Victoria Street, S.W. 1.

The Live Stock (Sales) Order, 1918.

THE Orders of the Food Controller relative to the sale of cattle and sheep for slaughter are consolidated in the Live Stock (Sales) Order* which came into force on 13th May. It also carries out arrangements recently made by the Ministry of Food with the Board of Agriculture and the representatives of the farmers with regard to the sale of cattle and sheep by dead-weight.

* Order No. 517, dated 8th May, 1918.

The Order provides that any beast fit for slaughter or any sheep may, at the option of the vendor with the concurrence of the Live Stock Commissioner, be sold by dead-weight. The dead-weight prices (including the value of the offals) are as follows :—

1. In the case of beasts (other than beasts fit for boning) the sum of 1*s.* 2½*d.* per lb.
2. In the case of beasts fit only for boning the sum of 11*d.* per lb.
3. In the case of sheep the sum of 1*s.* 2½*d.* per lb., in addition to the current market value of the skin, less the sum of ½*d.* per lb. or part of a lb.

"Per lb." means in each case per lb. of the certified weight of the dressed carcass. The seller of the beasts or sheep will be entitled to a reasonable opportunity of checking the weight of the carcass of any beast or sheep sold by him on the dead-weight system.

The decision of the authorised agent of the Ministry of Food in any market as to whether a beast is fit for slaughter, on the weight and grading of any beast, or on the weight and fair value of any sheep, is final. The conditions for the weighing of the dressed carcass are accurately laid down in order to minimise the possibility of error in determining the just weight. If the authorised person determines that a beast is fit for slaughter it cannot be moved from the market except with his authorisation.

Provision is made for tying farmers to individual markets with a view to regulating supplies and the prevention of unnecessary transport, and as soon as the process of allocation to markets is complete it will be illegal for a stockowner to sell cattle in any other than the prescribed market. Although the provisions of the Order do not apply to Ireland, this Clause will enable the Ministry of Food to determine to which markets Irish fat cattle sent to Great Britain for slaughter shall be allocated. It is also laid down that live stock fit for slaughter may not be moved from one area to another without the consent of the Area Live Stock Commissioner. (*National Food Journal*, 22nd May, 1918.)

Restriction of Slaughter of Live Stock.

THE authorised Government agent in any market has power under the new Live Stock (Sales) Order to determine which cattle are fit for slaughter, and instructions have been issued to Grading Committees to exercise their discretion in this matter in view of the fact that stores now at grass will put on weight of flesh during the next few weeks. Fortunately there is in the country at the present moment a sufficient quantity of frozen meat to satisfy rationed requirements. Consequently, it is in the national interest that slaughter should be severely restricted, and that no animal that will benefit by grazing should be brought forward to market. Consumption of frozen meat over a brief period will not only help to conserve and increase home-grown supplies for the autumn, it will release cold storage space for the heavy food imports now coming into the country. Farmers require no incentive to adopt a policy which secures them a better return for their outlay on breeding stock and stores, and consumers, if they once understand the urgency of the situation, will not grudge the small sacrifice involved in the temporary reduction of the proportion of British beef supplied to them. (*National Food Journal*, 22nd May, 1918.)

MR. J. R. CLYNES, M.P., has addressed the following Letter to a correspondent who desired explanation of the Ministry's scheme for the control of cattle and meat :—

Control of Cattle and Meat: Ministry of Food Scheme.

The object of the Ministry of Food is to ensure that a fair price shall be paid to the farmer for the meat produced, and to the meat trade for the food as delivered to the consumer. The best way of securing that the farmer is paid in accordance with the exact amount of meat which he produces is to weigh the actual meat produced from the carcass of each beast slaughtered and to pay the farmer accordingly. In view, however, of the difficulties inherent in this system of paying the farmer on the dead-weight basis, Lord Rhondda decided to maintain the present live-weight system save when a majority of the farmers in any locality are willing to sell on a dead-weight basis. Under the live-weight system there is at each authorised market (where alone it is legal for live stock to be sold for slaughter) a grading committee which grades every beast according to the estimated percentage of meat which it will yield. The grading committee consists of one representative each of the farmers and butchers, together with a Government valuer. They express the "grade" of a beast by a figure representing their estimate of the weight of meat to be derived from every 100 lb. of the actual weight of the living animal. Thus a beast which they estimate will yield 56 per cent. of meat or over is placed in Grade 1, one which they estimate will yield as much as 52 per cent. but less than 56 per cent. in Grade 2, and so on. The live beast is weighed, and the farmer is paid at a price per live hundredweight, which is fixed according to the grade in which the beast has been placed; that is to say, according to the quantity (and not the quality) of meat which it is likely to produce. The price per live hundredweight which the farmer is paid for a beast in Grade 1 is 75*s.*, and the price of a beast in Grade 2 is 70*s.* (and so on), because the former produces a greater weight of meat per live hundredweight; and, if the farmer were paid at the same rate per cwt. for each, he would not be paid for producing more meat.

The graded prices, including the value of offals, are worked out to give the farmer 1*s.* 2½*d.* per lb. of the weight of the carcass dressed as it appears entire in the butcher's shop, *i.e.*, per lb. of meat excluding all offals. The wholesale price of the meat is fixed at 1*s.* 0¾*d.* per lb., and the retail butcher's profit is fixed by the retail selling prices embodied in a schedule of prices for each different joint. This schedule allows the appropriate margin of profit. Owing to the reduced turnover consequent on smaller supplies of meat, the butcher's profits have been cut down, and out of these profits he has to cover all costs of rent, interest and wages. The wholesale and retail prices are fixed uniformly for the whole country and for meat of all qualities irrespective of the grading of the beast from which it comes.

With regard to the shortage of meat, it is common knowledge that last autumn some increased slaughter took place. This was largely due to the freedom of sale and purchase allowed to butchers and farmers, to the short supplies of frozen meat, and to the needs of the Army; but the extra number killed has been much exaggerated. We are now coming to the time when cattle must go on to the grass, and to give an additional supply, or even to keep up the present rate of slaughter of home-grown cattle, might result in the killing of a number

immature beasts; if these are allowed to remain on the grass during the summer months they will materially add to the available meat supplies.

The policy of the Ministry of Food for the next few months must obviously be to withdraw as small an amount of the live stock as possible, leaving the farmers to a large extent to be the judges in sending forward cattle as they are ready.

It may be pointed out that the whole of the marketing arrangements and many technical details dependent on them have been worked out, and are varied and improved as experience suggests, in close consultation with a strong Central Advisory Committee representative of the farmers' organisations, the Departments of Agriculture and the butchers' and meat trades' organisations and also of the Consumers' Council. The Ministry of Food are very glad to consider on their merits any definite improvements that may be suggested. (*National Food Journal*, 22nd May, 1918.)

The Cattle Feeding Stuffs (Maximum Prices) Order, 1918: General Licence.

THE Food Controller has by general licence* under the Cattle Feeding Stuffs (Maximum Prices) Order, 1918,† authorised on a sale of imported millers' offals, sold in sacks or bags, a charge for sacks or bags at the rate of 35*s.* per ton if sold in bags containing 1 cwt. or less, and 25*s.* per ton if sold in bags containing more than 1 cwt. (*National Food Journal*, 22nd May, 1918.)

Order Amending the Horse and Poultry Mixtures Order, 1917.

THE Food Controller, by an Order (No. 527), dated 13th May, 1918, has made the following Amendment to the Principal Order, No. 1173 of 1917 ‡:—

1. Clause 3 (*b*) (iii) of the Principal Order shall be revoked and the following Sub-clause shall be substituted therefor:—

"Where any of the ingredients have been bought by the maker before the 20th May, 1918, and have been mechanically treated before being delivered to the maker's factory, a sum fairly representing the cost of such treatment, except the cost of reconditioning, shall be deducted in ascertaining the cost. Where any of the ingredients have been bought by the maker on or after the 20th May, 1918, and have been mechanically treated before being delivered to the maker's factory (otherwise than by being reconditioned or rendered more merchantable by kiln-drying or other like treatment) a sum fairly representing the cost of such treatment shall be deducted in ascertaining the cost. Where any of the ingredients have been bought on or after the 20th May, 1918, and have been reconditioned or rendered more merchantable by kiln-drying or other like treatment before being delivered to the maker's factory, the cost of any such

* Order No. 533, dated 15th May, 1918.
† See this *Journal*, March, 1918, p. 1474.
‡ See this *Journal* for December, 1917, p. 1023.

ingredients shall not in any case be reckoned at a sum exceeding the *maximum price applicable on a sale thereof according to the Damaged* Grain, Seeds and Pulse (Prices) Order, 1917, as amended."

AN Order (No. 552), dated 21st May, 1918, has been made by the Food Controller to the effect that :—

The Use of Milk (Licensing) Order, 1918.

1. Except under and in accordance with the terms of a licence granted by the Food Controller, a person shall not on or after the 17th June, 1918, use any milk, skimmed milk, separated milk, dried milk, condensed milk, butter milk, or any milk preparation in the manufacture for sale of any chocolate, sugar confectionery, or other sweetmeats, or for any other manufacturing purpose except the manufacture of articles intended for human consumption.

2. (*a*) Except under and in accordance with the terms of a licence granted by the Food Controller, a person shall not on or after the 17th June, 1918, make for sale any condensed milk, dried milk, milk preparation, butter or cheese.

(*b*) This Clause shall not apply to the making of butter or cheese by a farmer or other producer on the farm where the milk is produced.

3. Except under and in accordance with the terms of a licence granted by the Food Controller, a person shall not, after the 17th June, 1918, sell or offer or expose for sale as milk, or under any description of which the word milk forms part, any liquid in the making of which dried milk or condensed milk had been used.

4. Infringements of this Order are summary offences against the Defence of the Realm Regulations.

5. The Milk Factories (Restriction) Order, 1917, and as respects Great Britain the Milk (Use of Chocolate) Order No. 2, 1917, is hereby revoked as at the 17th June, 1918, but without prejudice to any proceedings in respect of any contravention thereof.

*NOTE.—Applications for licences under this Order and correspon*dence with respect to this Order should be addressed to the Secretary, Ministry of Food (Milk Section), County Hall, Westminster Bridge Road, S.E. 1.

Preservation of Surplus Farmers' Butter.

IN many districts throughout Great Britain there is for the moment a surplus of farmers' butter, and it is important that all possible steps should be taken to secure that this is put to the best possible use. Outlets for surplus butter may be found through sales by retailers in the district, and through sales to blenders. It is not desired that the Food Control Committees should increase the ration of butter and margarine on account of the local surplus, but arrangements are being made under which they will summon meetings of retailers of butter and margarine in their areas and arrange that home-made butter should form as large a proportion as possible for the present of the supplies required to meet the needs of their registered customers—applications for margarine and for imported butter being reduced accordingly. In the case of caterers or institutions buying from wholesalers or direct from the Margarine Clearing House, similar steps should be taken to increase the purchase of home-made butter and to reduce temporarily supplies of imported butter and margarine.

Butter-blending factories exist in a number of districts, principally in the south-western area of England and in South Wales, and no permit is required by farmers desirous of sending butter to blending factories. In all arrangements which may be made for the disposal of surplus butter, it is necessary to secure concerted action between rural areas and adjoining urban areas.

Many householders have in the past been accustomed to buy considerable quantities of butter at this season of the year for salting and preserving for winter use. The Food Controller has issued an authorisation permitting the purchase of farmers' butter for this purpose, provided that application is made to the local Food Committee and permission received from them. Butter will only be supplied for this purpose in cases where the supply is in excess of the ration demand. Applicants will be required to state the quantities it is proposed to salt or preserve and the quantities which have been laid down in this way in the past. In procuring butter for this purpose a certificate must be given to the producer or shopkeeper at the time of purchase stating that it is for preserving. These certificates may be obtained from the local Committee. The quantity applied for may be decreased by the Committee at their discretion. Committees may grant permission of this kind to persons who have not previously been in the habit of preserving butter if this course is justified by circumstances.

The Food Control Committee will fix a date up to which purchases for preserving will be permitted in their district. The date will be fixed to suit local convenience. Butter thus preserved will not be consumed before the same date. Any households preserving butter in this manner will be entitled to consume it subsequently at self-supplier rates, *i.e.*, 6 oz. per member of his household, provided that any regulations as to marking of cards, etc., in the case of self-suppliers are observed.

The Ministry of Food are anxious that surplus milk should be devoted primarily to the manufacture of dried milk and of cheese, and the permission to salt down butter must not be taken as an incentive to produce butter in cases where the production of cheese is possible. A scheme is now under consideration for the collection of British cheese which will enable all producers to dispose satisfactorily of any cheese they may make from the present time onward. Those who propose to make cheese at home will find it useful to secure "Cheesemaking for Small Holders" (Leaflet 231), and "Manufacture of Cheese in Co-operative Dairies" (Special Leaflet 75), issued by the Board of Agriculture. These can be obtained free of charge and post free from the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. (*National Food Journal*, 22nd May, 1918.)

AN Order (No. 531), dated 14th May, 1918, has been made by the Food Controller to the following effect:—

British Cheese Order, 1917: Notice.

Pursuant to the powers reserved to him by Clause 2 of the British Cheese Order, 1917, as amended,* the Food Controller prescribes the prices set out in the Schedule as the maximum first-hand prices upon all sales made on and after the 18th May, 1918, of cheese as described in the Schedule.

* Orders Nos. 1105 of 1917, and 386 of 1918. See this *Journal*, No 1917, p. 910, and January, 1918, p. 1140 respectively.

The Schedule.

Variety of Cheeses.	First-hand Prices for Delivery on and after 18th May, 1918, until further notice.
	Per lb. s. d.
Caerphilly whole milk	1 2½
" partially skimmed	1 1
" wholly skimmed	0 11
Any whole milk cheese, not exceeding 2 lb. weight uncut, other than Caerphilly	1 6

Variety of Cheeses.	First-hand Prices for Cheese Manufactured—	
	Before the 11th May, 1918.	On and after 11th May, 1918, until further notice.
	Per lb. s. d.	Per lb. s. d.
Ripened Stilton and Wensleydale (blue)	1 7	1 7½
Dorset—Hand-skimmed blue	1 4½	1 2½
Dorset—separated blue ..	1 3	1 0½
" white	1 1½	0 11
All other whole-milk cheese	1 6	1 4
All other partially skimmed cheese	1 3	1 0½
All other wholly skimmed cheese	1 1½	0 11

THE following Regulations, dated 5th April, 1918, have been made by the Board, and became immediately operative:—

The Fertilisers and Feeding Stuffs (Methods of Analysis) Provisional Regulations, 1918.

1. The Fertilisers and Feeding Stuffs (Methods of Analysis) Regulations, 1908, are hereby amended by the substitution for paragraph (V.) of Regulation 3 of the following paragraph:—

(V.) *Determination of Potash.*

(*a*) *Muriate of Potash Free from Sulphates.*

A weighed portion of the sample (about 5 grams in the case of concentrated muriate of potash or 10 grams in the case of low-grade muriate) shall be dissolved in water, the solution shall be filtered if necessary and made up to 500 cubic centimetres. The potash shall be determined in 50 cubic centimetres of the solution either by the platinum chloride method, or by the perchloric acid method, prescribed below in Clauses (*e*) and (*f*) of this paragraph.

(b) *Salts of Potash containing Sulphates.*

A weighed portion of the sample (about 5 grams in the case of concentrated sulphate of potash or 10 grams in the case of kainit or other low-grade salts) shall be boiled with 20 cubic centimetres of hydrochloric acid and 300 cubic centimetres of water in a half-litre flask. Barium chloride solution shall be cautiously added, drop by drop, to the boiling solution until the sulphuric acid is completely precipitated. Any slight excess of barium shall be removed by the addition of the least possible excess of dilute sulphuric acid. The liquid (without filtration) shall be cooled, made up to 500 cubic centimetres and filtered. Fifty cubic centimetres of the filtrate shall be taken and evaporated to dryness, and shall then be moistened with concentrated hydrochloric acid, again evaporated to dryness, treated with a little dilute hydrochloric acid and filtered, if necessary. The potash shall be determined in the filtrate either by the platinum chloride method, or by the perchloric acid method, prescribed below in Clauses (*e*) and (*f*) of this paragraph. If the solution contains phosphates, iron, manganese, or other substances that would interfere with the determination of potash, the method prescribed in Clause (*c*) of this paragraph is to be used instead of the method prescribed in Clause (*b*).

(c) *Potash in Flue-Dust.*

Ten grams of the sample shall be gently ignited in order to char organic matter, if present, and shall then be boiled with 300 cubic centimetres of water. Ten cubic centimetres of concentrated hydrochloric acid shall be added slowly so as not to check the boiling which is to be continued for a further 10 minutes after the addition of the last portions of acid. The liquid shall be filtered into a half-litre flask and raised to the boiling point; and to the boiling liquid powdered barium hydroxide is to be added until there is slight excess. The liquid shall then be cooled, made up to 500 cubic centimetres and filtered. Of the filtrate, 250 cubic centimetres shall be treated with ammonia solution and excess of ammonium carbonate, and, while boiling, with a little powdered ammonium oxalate. It shall then be cooled, made up to 500 cubic centimetres and filtered. Of the filtrate, 50 cubic centimetres or 100 cubic centimetres, according to the amount of potash expected, shall be evaporated in a porcelain dish to dryness. If desired, nitric acid may be added during the evaporation after free ammonia has been driven off. The residue is to be heated gently over a low flame until all ammonium salts are expelled, the temperature being carefully kept below that of low redness. The residue shall be moistened with concentrated hydrochloric acid, evaporated to dryness, treated with dilute hydrochloric acid, filtered, and the potash determined in the filtrate either by the platinum chloride method or by the perchloric acid method, prescribed below in Clauses (*e*) and (*f*) of this paragraph.

(d) *Potash in Guanos, and Mixed Fertilisers.*

Ten grams of the sample shall be gently ignited in order to char organic matter, if present, and shall then be heated for 10 minutes with 10 cubic centimetres of concentrated hydrochloric acid, and finally boiled with 300 cubic centimetres of water. The liquid shall be filtered into a half-litre flask, raised to the boiling point, and a slight excess of powdered barium hydroxide shall be added. The contents of the flask shall be cooled, made up to 500 cubic centimetres and filtered. Of the filtrate, 250 cubic centimetres shall be treated with ammonia solution

and excess of ammonium carbonate, and then, while boiling, with a little powdered ammonium oxalate, cooled, made up to 500 cubic centimetres and filtered. Of the filtrate, 100 cubic centimetres are to be evaporated in a porcelain dish to dryness. If desired, nitric acid may be added during the evaporation after free ammonia has been driven off. The residue is to be heated gently over a low flame, till all ammonium salts are expelled, the temperature being carefully kept below that of low redness. The residue shall be moistened with concentrated hydrochloric acid, evaporated to dryness, treated with dilute hydrochloric acid and filtered. The potash shall be determined in the filtrate either by the platinum chloride method, or by the perchloric acid method, prescribed below in Clauses (*e*) and (*f*) of this paragraph.

(*e*) *Platinum Chloride Method.*

To the solution obtained as above described in Clauses (*a*), (*b*), (*c*) or (*d*) of this paragraph a few drops of hydrochloric acid shall be added, if none is present, and also 10 or 20 cubic centimetres (according to whether the portion weighed was 5 grams or 10 grams) of a solution of platinum chloride containing 10 grams of platinum per 100 cubic centimetres. After evaporation to a syrupy consistency on a water-bath, the contents of the basin shall be allowed to cool and shall then be treated with alcohol of specific gravity 0·864, being washed by decantation until the alcohol is colourless. The washings shall be passed through a weighed or counterpoised filter paper, on which the precipitate shall be finally collected, washed with alcohol as above, dried at 100° C. and weighed.

The precipitate is to be regarded as K_2PtCl_6, and is to be calculated to its equivalent as K_2O.

(*f*) *Perchloric Acid Method.*

To the solution obtained as above described in Clauses (*a*), (*b*), (*c*) or (*d*) of this paragraph and placed in a small glass or porcelain basin, 7 cubic centimetres, or 12 cubic centimetres (according to whether the portion weighed was 5 grams or 10 grams) of a 20 per cent. solution of perchloric acid (specific gravity 1·125) shall be added. The basin shall be placed on a hot plate or sand bath and the contents evaporated until white fumes are copiously evolved. The precipitate shall be re-dissolved in hot water, a few drops of perchloric acid solution added, and the whole concentrated again to the fuming stage. After cooling, the residue in the basin shall be thoroughly stirred with 20 cubic centimetres of alcohol of specific gravity 0·816 to 0·812 (95 to 96 per cent. of alcohol by volume). The precipitate shall be allowed to settle, and the clear liquid shall be poured through a weighed or counterpoised filter paper, or through a gooch crucible, draining the precipitate as completely as possible from the liquid before adding the washing solution. The precipitate shall be washed by decantation with alcohol (as above) saturated with potassium perchlorate at the temperature at which it is used, pouring the washings through the paper or gooch crucible on which the whole of the precipitate is finally collected, dried at 100° C., and weighed.

The precipitate is to be regarded as $KClO_4$, and is to be calculated to its equivalent as K_2O.

2. Nothing herein contained shall affect an analysis made before the commencement of these Regulations or the validity of any certificate of an analysis so made or any legal proceedings in respect of any sample to which any such analysis or certificate relates.

THE following Notice (F.P. 266), dated 4th May, 1918, has been issued by the Food Production Department of the Board :—

Maximum Prices of Sulphate of Ammonia, Superphosphate and Ground Basic Slag: Season 1st June, 1918—31st May, 1919.

Under the Fertiliser Prices Order, 1918,* maximum prices are fixed for the sale of the above fertilisers, as from 1st June, 1918, to 31st May, 1919. These prices are, on the average, the same as those ruling in 1917-18, except that in the case of basic slag a small increase of price is made to cover increased cost of manufacture. Basic slag is to be sold in 1918-19 at a delivered price based on the percentage of total phosphates *contained in the basic slag, without reference to citric solubility.*

The following summary sets out shortly for the information of purchasers the effect of the main provisions of the Order in regard to the *prices of fertilisers, but should any doubt exist or dispute occur, reference* must be made to the Order itself, copies of which may be obtained from the Food Production Department.

The Order also prescribes the arrangements for distributing the fertilisers throughout the country, and makers, merchants, dealers and co-operative societies should familiarise themselves with these arrangements, which are dealt with in Food Production Notice No. 254.†

I. **Basis Prices.**—The basis prices are the maximum net cash prices for sulphate of ammonia, superphosphate and ground basic slag, in makers' 2-cwt. bags, delivered in railway truck or free *ex* barge or ship at purchaser's or consumer's siding, railway station or wharf anywhere in the United Kingdom, or (in the case of basic slag) anywhere in England Scotland or Wales and c.i.f. Irish Ports. Such basis prices are as follows :—

SULPHATE OF AMMONIA.

(*a*) For sulphate of ammonia, containing 24½ per cent. ammonia, sold for delivery in the periods shown below, the basis prices are :—

Date for Delivery.	*Price.* £	s.	d.	
1st June—31st August, 1918	15	5	0	per ton.
1st September—30th November, 1918	15	15	0	,,
1st December, 1918—28th February, 1919	16	5	0	,,
1st March—31st May, 1919	16	15	0	,,

(*b*) For sulphate of ammonia containing more than 24½ per cent. of ammonia, the maximum prices are increased by 3*s*. 3*d*. per ton for each complete quarter per cent. above 24½ per cent., whilst for sulphate of ammonia falling below 24½ per cent. a corresponding reduction in price must be made, except that in this case fractions of ¼ per cent. are to be taken into account.

An additional charge (not exceeding 5*s*. per ton) may be made for sulphate of ammonia containing less than ·025 per cent. of free acid. The object of this charge is to encourage makers to produce sulphate of ammonia in the best possible mechanical condition.

* See this *Journal*, May, 1918, p. 221.

† Not here printed. Copies may be obtained on application to the Fertilisers Allocation Joint Committee, 72, Victoria Street, S.W. 1.

Prices of the Grades Most Commonly Sold.

Percentage of Tribasic Phosphate of Lime soluble in Water.	1918. June.	July.	August.	September.	October.	November.	December.	1919. January.	February.	March.	April.	May.
Per cent.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
26 to 27 ..	6 5 0	5 12 6	5 14 0	5 15 6	5 17 0	5 18 6	6 0 0	6 1 6	6 3 0	6 4 6	6 6 0	6 7 6
27 ,, 28 ..	6 7 6	5 15 0	5 16 6	5 18 0	5 19 6	6 1 0	6 2 6	6 4 0	6 5 6	6 7 0	6 8 6	6 10 0
28 ,, 29 ..	6 10 0	5 17 6	5 19 0	6 0 6	6 2 0	6 3 6	6 5 0	6 6 6	6 8 0	6 9 6	6 11 0	6 12 6
29 ,, 30 ..	6 12 6	6 0 0	6 1 6	6 3 0	6 4 6	6 6 0	6 7 6	6 9 0	6 10 6	6 12 0	6 13 6	6 15 0
30 ,, 31 ..	6 15 0	6 2 6	6 4 0	6 5 6	6 7 0	6 8 6	6 10 0	6 11 6	6 13 0	6 14 6	6 16 0	6 17 6
31 ,, 32 ..	6 19 0	6 6 6	6 8 0	6 9 6	6 11 0	6 12 6	6 14 0	6 15 6	6 17 0	6 18 6	7 0 0	7 1 6
32 ,, 33 ..	7 3 0	6 10 6	6 12 0	6 13 6	6 15 0	6 16 6	6 18 0	6 19 6	7 1 0	7 2 6	7 4 0	7 5 6
33 ,, 34 ..	7 7 0	6 14 6	6 16 0	6 17 6	6 19 0	7 0 6	7 2 0	7 3 6	7 5 0	7 6 6	7 8 0	7 9 6
34 ,, 35 ..	7 11 0	6 18 6	7 0 0	7 1 6	7 3 0	7 4 6	7 6 0	7 7 6	7 9 0	7 10 6	7 12 0	7 13 6
35 ,, 36 ..	7 15 0	7 2 6	7 4 0	7 5 6	7 7 0	7 8 6	7 10 0	7 11 6	7 13 0	7 14 6	7 16 0	7 17 6

Where a purchaser requires sulphate of ammonia to be specially ground or pulverised, an extra charge of 5*s.* per ton may be made.

The above increases and deductions do not apply to sales of less than 2 cwt.

SUPERPHOSPHATE.

The basis prices for any grade of superphosphate may be calculated by taking as a basis the price of £6 10*s.* for 30-31 per cent. water soluble sold for delivery during December, 1918. The price for superphosphate of this grade sold for delivery during other months will be 1*s.* 6*d.* per ton less for each month from July to December, and 1*s.* 6*d.* per ton more for each month subsequent to December, with a maximum decrease or increase of 7*s.* 6*d.* per ton. For example, the price for 30-31 per cent. for delivery in July, 1918, will be £6 2*s* 6*d.*, and for delivery during May, 1919, will be £6 17*s.* 6*d.* The price for June, 1918, deliveries remains, however, as fixed by the Superphosphates Order, 1917, *i.e.*, £6 15*s.* per ton.

For other grades the price decreases by 2*s.* 6*d.* for each complete unit of water soluble phosphates below 30 per cent., and increases by 4*s.* for each complete unit above 30 per cent.

The table on p. 360 shows the prices of the grades most commonly sold.

GROUND BASIC SLAG.

(*a*) For ground basic slag sold for delivery during the period 1st September, 1918, to 28th February, 1919, the basis prices are :—

Percentage of Total Phosphate (calculated in terms of Tribasic Phosphate of Lime.)	*Price per ton.*
12	60*s.*
14	62*s.*
16	64*s.*
18	66*s.*
20	68*s.*
22	70*s.*
24	73*s.*
26	76*s.*
28	79*s.*
30	82*s.*
32	85*s.*
34	88*s.*
36	91*s.*
38	94*s.*
40	97*s.*
42	100*s.*

(*b*) In the case of sales of ground basic slag for delivery during other months the maximum prices for all qualities will be less than the prices set out above, in accordance with the following table :—

Month for Delivery.		*Reduction in Maximum Price set out above.*
June	1918	4*s.* per ton.
July	,,	3*s.* ,,
August	,,	2*s.* ,,
March	1919	2*s.* ,,
April	,,	3*s.* ,,
May	,,	4*s.* ,,

(c) The foregoing prices for all qualities are for basic slag ground in such a way that at least 80 per cent. will pass through a sieve containing 10,000 holes to the square inch. If the slag sold be less finely ground, an allowance must be made to the purchaser at the rate of 3*d*. for each 1 per cent. by which the quantity which will pass through the sieve is less than 80 per cent., but where the quantity which will pass through the sieve is less than 75 per cent. an additional allowance must be made to the purchaser at the rate of 9*d*. for each 1 per cent. by which the quantity passing through the sieve is less than 75 per cent.: *e.g.*, where the percentage passing through the sieve is 75 per cent., a reduction at the rate of 1*s*. 3*d*. per ton is to be made, but where the percentage passing through the sieve is only 70 per cent., the reduction will be at the rate of 6*s*. 3*d*. per ton.

(d) An additional charge at the rate of 2*s*. 6*d*. per ton may be made for basic slag packed in special bags for carriage by sea.

II. **Prices other than Basis Prices.**—The Order prohibits sales or purchases of any of the three fertilisers for delivery at maker's works or nearest railway station or wharf, where the fertiliser is to be transported by rail or water. The following sales are, however, authorised, at the prices mentioned below, namely:—

(a) *Sales for delivery at maker's works for conveyance direct by road to purchaser's or consumer's premises.*—The price for such sales is 10*s*. per ton less than the basis price, the purchaser or consumer providing the cart or other vehicle. If the maker provides the vehicle, the purchaser or consumer may be charged by the maker the cost of carting from the works to purchaser's or consumer's premises at not more than local rates. In all cases where the purchaser is not the consumer, it will be necessary for the maker to obtain a licence before effecting the sale.

(b) *Sales for delivery* ex *railway goods yard or public wharf.*—The maximum price for such sales is 2*s*. 6*d*. per ton in excess of the basis price, except that no addition to the basis price is to be made in the case of sales of more than 1 ton.

For example, in the case of a truck load being consigned to a dealer at one station and re-sold in 6 1-ton and 1 2-ton lots, an extra charge of 2*s*. 6*d*. per ton over the basis price may be made by the dealer on each of the 6 1-ton lots, but no extra charge may be made on the 2-ton lot.

(c) *Sales for delivery* ex *vendor's store or shop or* ex *warehouse.*—The maximum prices for such sales are the basis prices, with the following additions according to the quantity of fertiliser purchased:—

	s.	*d.*	
1 ton and over	10	0	per ton.
2 cwt. and over but less than 1 ton ..	1	0	per cwt.
1 " " " 2 cwt. ..	2	0	"
28 lb. " " 1 " ..	3	0	"
14 " " " 28 lb. ..	4	0	"

For example, taking the basis price of 30-31 per cent., superphosphates in December at £6 10*s*. per ton, the price for sales by merchants or dealers *ex* store will be:—

	£	s.	d.	
1 ton and over	7	0	0	per ton.
2 cwt. but less than 1 ton	0	7	6	per cwt.
1 „ „ 2 cwt.	0	8	6	„
28 lb. „ 1 cwt.	0	9	6	„
14 „ „ 28 lb.	0	10	6	„

In addition, where the vendor's store or shop is more than 2 miles from the nearest railway station or wharf, the vendor must bear the cost of carting the fertiliser from the station or wharf to his shop in all cases for a distance of 2 miles, but may charge the extra cost involved in carting it a greater distance.

(d) *Sales for delivery direct by road or barge from vendor's shop or store, or from warehouse, railway goods yard or public wharf to consumer's premises.*—The maximum prices for such sales are the same as those for sales or delivery *ex* such shop, store, warehouse, goods yard or wharf, plus the cost of cartage or barging to the consumer's premises.

III. **Authorised Variations in Price.**—The following variations in the above prices are authorised or prescribed by the Order :—

(a) *Small Sales by Makers.*—Makers selling any of the three fertilisers in smaller quantities than 2 tons may charge the retail prices set out under II. (c) and (d) above in all cases, except where the sale is for delivery *ex* railway goods yard or public wharf.

(b) *Credit Sales.*—Where credit is given to the purchaser, a reasonable extra charge may be made, but the discount allowed for net cash must be quoted on the invoice given to the purchaser and must be such as to bring the net cash price down to the maximum price authorised.

(c) *Bags.*—On sales of 1 ton or more for delivery in bags containing less than 2 cwt. each, a reasonable extra charge may be made, whilst where purchaser's bags are used, or the purchaser takes delivery in bulk, a reasonable allowance must be made to the purchaser.

IV. **Small Consignments by Rail.**—The Order prohibits, except under special licence to be obtained by the seller, consignments of less than 4 tons by rail, and such licences will only be issued in quite special circumstances. Accordingly, persons whose requirements for delivery at any time are less than 4 tons, should either purchase from local dealers, or else arrange with neighbours to make up a total order of 4 tons or over for delivery to their nearest station.

Makers will be instructed to give priority to orders for full truck loads.

V. **Existing Contracts Unaffected.**—The Order does not rescind or affect any contracts entered into previously to 1st May, 1918, even though the fertiliser is to be delivered after the 31st May. Copies of the Order may be obtained from the Food Production Department, 72, Victoria Street, S.W. 1.

VI. **Important Notice to Farmers.**—*Approved Fertiliser Agents.*—The Food Production Department is appointing as "Approved Fertiliser Agents" agricultural merchants, dealers, and co-operative societies in each county in England and Wales. These agents are required to store

quantities of superphosphate, sulphate of ammonia, and basic slag, more especially to meet the demands of allotment holders and small growers. It is important to note that the storage of fertilisers by approved agents is not intended to take the place of the immediate *ordering by farmers of their full year's requirements.*

Farmers should place orders with these agents or with the merchants or co-operative societies from whom they usually obtain supplies, but in the event of their being unable to purchase through these sources they should communicate with the Food Production Department (Supplies Division), 72, Victoria Street, London, S.W. 1.

Orders to be placed at once.—The supplies of these fertilisers are not likely to be enough to meet all demands. The sliding scales of prices are designed to make it worth the farmer's while to take early delivery, and it is only by so doing that he can make sure of obtaining his supplies.

THE following Notice was issued by the Food Production Department of the Board on 6th May :—

Appointment of Approved Agents for the Sale of Fertilisers in England and Wales, 1918-19.

1. The Fertiliser Prices Order, 1918, fixes the prices of superphosphate, sulphate of ammonia, and basic slag, and also provides for the control of distribution by the Agricultural Departments. The growing difficulties of railway transport, due to the shortage of wagons and sheets, have made it necessary for the Department to regulate both sales and deliveries of these fertilisers in order to ensure that the available supply shall be distributed so as to secure the maximum production of food. Information as to the system of licensing which is compulsory on all makers is given in a separate Circular, F.P. 254, but the Department also proposes to appoint approved agents for the sale of fertilisers in each county in England and Wales as a supplementary means of promoting local distribution and storage.

2. These approved agents will comprise merchants, dealers, and co-operative societies (including makers carrying on a retail trade) who undertake :—

(*a*) To store, before 31st August in the case of sulphate of ammonia, and before 30th September in the case of superphosphate and basic slag, on their own premises or on premises hired for the purpose, a quantity, representing not less than one-tenth of the total quantity of these fertilisers to be purchased during the year, June, 1918, to May, 1919.

(*b*) To maintain this minimum quantity in store, replacing it as sold throughout the season, until 15th February, 1919, and one-half of this quantity (*i.e.*, one-twentieth of the total for the twelve months) from 15th February to 15th April, 1919, except in the case of basic slag, which need not be stored after 15th February.

(*c*) To maintain a stock of and to undertake to sell these fertilisers in 14 lb., 28 lb., 56 lb., and 1 cwt. lots, as required to meet the needs of allotment holders and small growers in the approved agent's district, especially between 1st January and 15th April, 1919.

Note.—Under the above arrangement an approved agent whose average total annual sales amounted to 150 tons of sulphate of ammonia,

200 tons of superphosphate, and 150 tons of basic slag, would keep in stock until 15th February, 1919, not less than 15 tons of sulphate of ammonia, 20 tons of superphosphate, and 15 tons of basic slag, replacing quantities sold from time to time, and one-half the above amounts of sulphate of ammonia and superphosphate during the subsequent two months.

3. Priority in the allocation of supplies will, as far as possible, be given to approved agents complying with the above conditions, though the Department will only be in a position to do this in respect of definite applications received before 18th May, 1918. An endeavour will, however, be made throughout the year to meet the needs of approved agents provided their requirements are notified to the Department sufficiently in advance.

4. The Department will publish on or about 15th September, 1918, for supply to Agricultural Executive Committees and for circulation to farmers and allotment holders, lists of names and addresses of those approved agents in each county who have undertaken to store not less than 10 tons of sulphate of ammonia and quantities of superphosphate and basic slag proportionate to their annual purchases. Approved agents will also be entitled to describe themselves as "Approved Fertiliser Agents of the Food Production Department."

5. The undertaking that not less than 10 per cent. of their annual purchases will be stored on their own premises, or on premises hired for the purpose, for local sale throughout the season must be regarded as binding, and the name of any firm which fails to comply with this undertaking will be struck off the list.

6. Approved agents having premises in more than one county can be recognised in respect of each county, but in such cases they must undertake to store 10 per cent. of their purchases for delivery in each of the counties. A separate application should be made in respect of each county.

7. The Fertiliser Prices Order, in addition to a sliding scale of prices according to date of delivery, allows increased charges for sales from store, shop or warehouse, and the Department is advised that these two allowances taken together are sufficient to cover the cost of storage and to allow a reasonable profit to merchants.

8. Licences to sell blast furnace flue-dust and other forms of potash (if available) will only be issued to approved agents, but there is no obligation to store these materials. Approved agents who receive licences will, however, be expected to store sufficient quantities to meet the needs of allotment holders.

9. If it should subsequently be necessary to appoint selected dealers for the distribution of seeds or other agricultural supplies, the approved agents will not necessarily be appointed, though their applications will receive careful consideration.

10. The conditions which applied to the appointment of approved agents during the season 1917-18 in regard to the storage of sulphate of ammonia are cancelled, and such agents must make fresh application in accordance with the new conditions.

11. The names of firms applying to be appointed as approved agents will be submitted to the Supplies Sub-Committees of the County Agricultural Executive Committees, and the Supplies Sub-Committees will be asked to satisfy themselves from time to time that the approved agents are carrying out their obligations.

12. The Department has sanctioned the formation in each county by the National Association of Corn and Agricultural Merchants (Head Office: 16, Mark Lane, London, E.C. 3) of an Advisory Committee of merchants, upon which the local Agricultural Co-operative Societies will also be represented. It is desirable that the approved agents shall keep in touch with the secretaries of the Advisory Committees of Merchants, who will be able to give them advice and inform them as to the detailed working of the distribution scheme.

13. Merchants, dealers and co-operative societies wishing to become approved agents should make application to the Food Production Department before 18th May, on the prescribed form F.P. 265, stating the quantity of sulphate of ammonia, superphosphate, and basic slag they are prepared to purchase and the quantity they will keep in stock, *i.e.*, stored on their own or hired premises to meet local needs.

14. Orders for superphosphate for delivery by 31st August should be placed with the maker at the same time as the application is made. Makers of basic slag should also be notified of the quantity which the approved agent desires to purchase on an annual contract. The requirements of sulphate of ammonia will be dealt with direct by the Department, and the approved agent informed of the maker from whom he can obtain supplies.

Merchants should note that no maker will be licensed to supply superphosphate or ground basic slag to destinations involving a through rate for transport of more than 12*s.* 6*d.* per ton or in the case of sulphate of ammonia of more than 5*s.* per ton without the special permission of the Department.

THE following Notice was issued by the Food Production Department towards the end of May:—

Fertiliser Supplies: Urgent Warning to Farmers.

Farmers are urged by the Food Production Department to give immediate attention to the question of their supplies of fertilisers for next season. There is an extreme likelihood of an unavoidable shortage of sulphate of ammonia, superphosphate and ground basic slag, and only those farmers who order early are likely to secure their supplies in full and in good time. The Department is appointing as approved fertiliser agents a large number of agricultural merchants, dealers, and co-operative societies in each county of England and Wales. These agents are required to store quantities of sulphate of ammonia, superphosphate and basic slag. But this storage is intended more especially to meet the demand of allotment holders and small growers. It is not intended to take the place of an immediate order by farmers for their full year's requirements. Farmers, therefore, should place orders without delay with the approved agents or with such other merchants, dealers, or co-operative societies as usually supply them. A sliding scale of prices makes it well worth the farmer's while to order early and take early delivery. If for any reason a farmer should find difficulty in purchasing through his ordinary sources of supply he should communicate immediately, giving all necessary details, with the Food Production Department (Supplies Division), 72, Victoria Street, London, S.W. 1, from whom also he can obtain free a copy of the Department's General Notice to Farmers giving particulars as to the maximum prices for sulphate of ammonia, superphosphate, and basic slag for the season 1st June, 1918,

to 31st May, 1919.* The prices, it may be mentioned, are fixed under the Fertiliser Prices Order, 1918. On the average they are the same as those ruling in 1917-18, except as to basic slag, the price of which is slightly increased for next season. The slag is to be sold in 1918-19 at a delivered price on the percentage of total phosphates without reference to citric solubility. Owing to the need of economising railway transport farmers must accept whatever grade of slag is offered to them by their suppliers.

Caterpillar Attacks; Arsenate of Lead Spraying.

ACCORDING to a Notice issued by the Food Production Department on 27th May, reports received by the Department showed that fruit trees were suffering from bad attacks of caterpillar in many districts. Fruit growers were urged to spray their trees without delay with a solution containing ½ lb. of lead arsenate paste to every 10 gal. of water. This spray-fluid if applied properly will kill the caterpillars and prevent further defoliation. The application should be made in a fine spray sufficient to wet the leaves without drenching them.

Care must be taken that no vegetables or green gooseberries grown in the neighbourhood of the sprayed trees are gathered for consumption within a month of the application, as lead arsenate is a very poisonous chemical; nor must trees in full bloom be sprayed, as otherwise bees and other insects useful in pollenating flowers may be killed.

Food Production Leaflet No. 32 gives full information as to the control of both caterpillars and aphides; it may be obtained free of charge on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

The Beehive Section (Maximum Prices) Order, 1918.

AN Order (No. 521), dated 10th May, 1918, has been made by the Food Controller to the effect that:—

1. A person shall not on or after the 13th May, 1918, sell or offer to expose for sale or buy or offer to buy 1 lb. beehive sections of a description or quality set out in the Schedules to this Order at prices exceeding the maximum prices applicable thereto according to the provisions of this Order.

2. The maximum prices shall be as follows:—

(*a*) On the occasion of a wholesale sale at the rates set out in the First Schedule to this Order; and

(*b*) On the occasion of a retail sale at the rates set out in the Second Schedule to this Order.

3. On the occasion of any sale—

(*a*) No charge may be made for boxes, packages, or packing or for giving credit;

(*b*) The price is a price *ex* seller's premises, and all cost of transport from such premises shall be for the buyer's account.

4. A person shall not in connection with the sale or disposition, or proposed sale or disposition, of any beehive sections to which this Order applies enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

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* See p. 359.

5. For the purposes of this Order —

The expression "wholesale sale" shall mean the sale of any quantity to a person buying for the purpose of re-sale.

The expression "retail sale" shall mean any sale other than a wholesale sale.

First Schedule.

MAXIMUM PRICES ON WHOLESALE SALES.

Column 1. Description of beehive sections—	*Column* 2. *Maximum Prices: Rate per* 1,000. s. d.
First Quality:	
Split top	43 9
Grooved 3 sides and split 4th side	45 9
Second Quality:	
Split top	42 0
Grooved 3 sides and split 4th side	43 9

Second Schedule.

MAXIMUM PRICES FOR RETAIL SALES.

Column 1.	Column 2.				
	Maximum Prices.				
	Where number sold is :—				
Description of Beehive Sections.	49 or less at the rate per 25 of	50 or over but less than 100, at the rate per 50 of	100 or over but less than 500, at the rate per 100 of	500 or over but less than 1,000, at the rate per 500 of	1,000 or over at the rate per 1,000 of
First Quality:	s. d.	s. d.	s. d.	s. d.	s. d.
Split top ..	1 7	3 0	5 6	25 6	50 0
Grooved 3 sides and split 4th side ..	1 9	3 3	6 0	26 6	52 0
Second Quality:					
Split top ..	1 6	2 11	5 4	24 6	48 0
Grooved 3 sides and split 4th side ..	1 8	3 2	5 10	25 6	50 0

THE following announcement with reference to Farmers' Income Tax for the year ending 5th April, 1919, was made by the Board on 15th May, 1918:—

Farmers and Income Tax.

1. The new Budget proposals provide that the profits of a farmer assessed under Schedule B shall be reckoned as equal to twice the full rent or annual value of the land which he farms. This means that if the proposals become law, a farmer who was liable to Income Tax in 1917 will be called upon to pay in January and July, 1919, on an assessed profit which will be double that on which he paid in

January and July, 1918; whilst a large number of farmers who have hitherto been exempt from Income Tax will now become liable.

2. A farmer, however, *has the right to elect to be assessed under* Schedule D instead of under Schedule B. In order to be so assessed he must give notice to the Surveyor of Taxes before 5th June, 1918. The assessment under Schedule D must be based on the average of his profits for the three years, 1915, 1916 and 1917.

3. Although a farmer does not elect to be assessed under Schedule D he will not be bound to pay the tax assessed under Schedule B on twice his rental value *if he can prove that he has not made that amount of profit.* He can give notice to the Surveyor of Taxes at the end of his farming year and claim to pay on the actual profit which he can prove he has made.

4. ***Both in the case of an assessment under Schedule D and in the case of an appeal against an assessment under Schedule B at the end of the year the production of accounts will be necessary.***

5. These accounts may be kept in the simplest possible form provided that they give the following particulars:—

I. The value of the live stock, implements, corn, hay, straw and other produce; seeds, manures and other stores, at the beginning of the year and again at the end of the year.

II. The payments made during the year for rent, rates, purchases of stock, feeding-stuffs, manures and other outgoings incurred in carrying on the farm.

III. The receipts during the year from the sale of stock, corn or other farm produce, together with an estimate of the value of the farm produce (meat, poultry, eggs, etc.) consumed by the farmer and his family.

IV. The farm debts owing to and by the farmer at the beginning of the year and at the end of the year.

The value of stock, etc., and the debts owing *to* the farmer at the beginning of the year, together with the year's expenditure, will form the debit side of the account after deducting the debts owing *by* the farmer at the beginning of the year.

The value of the stock, etc., and of the debts owing *to* the farmer at the end of the year, together with the year's receipts, will form the credit side of the account after deducting the debts owing *by* the farmer at the end of the year.

The excess of the credit side over the debit side will give the year's profit.

6. Properly the valuation at the beginning and end of the year should include, besides live and dead stock, the tillages, growing crops, unexhausted manures, etc. The Income Tax authorities are, however, prepared to accept an account that does not contain these latter items provided that the farmer can certify that the valuation has not materially altered during the year, or that he can give particulars of any increase or decrease which has taken place.

7. The farmer should therefore remember that, although he will have to pay in January, 1919, one-half of the amount of the tax assessed upon him under Schedule B, he will be able, as soon as his farming year is ended and he has his accounts ready, to claim to pay tax only on his actual profits.

If his claim is admitted by the Income Tax authorities his exact liability will be determined and adjusted before the second instalment of the tax falls due on the 1st July, 1919, and he will get a rebate of any part of the tax paid in January, 1919, which proves to have been overcharged.

8. As those farmers who have not hitherto kept accounts would be unable to render an account for the year ending on or before 5th April, 1919, the Board of Inland Revenue will, if such farmers start to keep accounts now, accept a statement of account for the year ending on 1st June, 1919.

9. The farmer who has not hitherto kept accounts must begin to do so before the 1st June if he is to take advantage of the provision that enables him to pay Income Tax on his profits instead of his double rent. He should begin at once to make an inventory of the live and dead stock on the farm, entering all the items in a book and putting the values opposite each. He should buy one of the simple farm account books which can be obtained as a rule from any country stationer, and from 1st June enter in it the payments he makes and the monies he receives according to the instructions he will find therein.

10. It is also desirable that farmers who have not a banking account at present should open one, as their bank pass-books might be of use to them in substantiating a claim for reduction of their assessment.

11. A farmer whose total rent does not exceed £65 a year, and who has no other source of income whatever, will be exempt from Income Tax.

Copies of this announcement can be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

New Minimum Rates of Wages for Male Workmen in Northamptonshire.

THE Agricultural Wages Board (England and Wales) have fixed the following minimum rates of wages for male workmen of 18 years of age and over employed in agriculture for time-work in the area comprising the administrative counties of Northampton and Soke of Peterborough and the county boroughs of Northampton, that is to say :

1. The wages payable for employment in Summer (as hereinafter defined) of male workmen in agriculture of 18 years of age and over, shall be not less than wages at the minimum rate of 30*s*. for 54 hours (exclusive of meal times).

2. The wages payable for employment in Winter (as hereinafter defined) of male workmen in agriculture of 18 years of age and over, shall be not less than wages at the minimum rate of 30*s*. for 48 hours (exclusive of meal times).

3. The above minimum rates shall apply to all male workmen of 18 years of age and upwards who are wholly or partly employed in agriculture within the meaning of Section 17 (1) of the Corn Production Act, 1917, in the above-mentioned area during such time as they are so employed.

4. For the purpose of the above minimum rates employment in Summer shall be deemed to be employment during the period commencing on the first Monday in March and terminating on the last Sunday in October; and employment in Winter shall be deemed to be employment during the rest of the year.

5. The above minimum rates shall come into operation on the 27th day of May, 1918.

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s*. and the cost of the telegrams, computed at 9*d*. per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 4.30 p.m.,

and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director, Meteorological Office, South Kensington, London, S.W. 7, with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than six consecutive days, during which the forecasts are to be sent.

Illegal Dog-Feeding.

THE attention of the Ministry of Food has been drawn to a statement which has recently appeared in the Press to the effect that certain shopkeepers are selling broken Army biscuits to be used for feeding dogs.

The Ministry point out that the use of these biscuits for purposes other than human food is in contravention of the Wheat, Rye and Rice (Restriction) Order, 1917,* and that any person having knowledge of such use should communicate the facts to the Ministry of Food (Enforcement Branch), 18, Upper Grosvenor Street, W. 1, or to his Food Control Committee. (*National Food Journal*, 22nd May.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for May, 1918, issued by the International Institute of Agriculture, contains particulars concerning the sowing of winter cereals in the Northern Hemisphere. The areas estimated to have been sown with *wheat* in 1917-18, compared with the areas sown during the corresponding period of 1916-17, expressed as percentages, are as follows:—Denmark 102, Spain 99, France 107, England and Wales 115, Scotland 122, Luxemburg 105, Canada 88, United States 105, British India 105, Japan 118, Tunis 115; with *rye*:—Denmark 118, Spain 109, France 96, England and Wales 103, Luxemburg 95, United States 145; with *barley*:—Spain 111, France 92, England and Wales 100, Japan 99, Tunis 145; with *oats*:—Spain 129, France 106, England and Wales 100, Tunis 117.

France.—According to an official report on the agricultural position, dated 1st May, 1918, April was generally wet and cold, and consequently field work has been delayed and vegetation is backward. Crops and pastures, however, look well, and the planting of potatoes and root crops is well forward. The frosts have done some harm not only to vines, but to various fruit trees, especially apricots, peaches and plums (*Journal Officiel de la République Française*, 6th May, 1918.)

Canada.—According to a report issued on 14th May, by the Census and Statistics Office, the area of winter wheat sown, viz., 711,000 acres, was reduced to 348,670 acres through winter killing, and the condition of the crop on 30th April indicates a yield per acre only 71 per cent.

* See this *Journal*, May, 1917, p. 236.

of the average for the past nine years. Spring seeding has made excellent progress, the proportion of spring wheat seeded by 30th April being 66 per cent. (13 per cent. last year), of oats 24 per cent. (12 per cent. last year) and of barley 20 per cent. (9 per cent. last year).

United States.—According to a report issued on 7th June by the Statistician of the Department of Agriculture the condition of crops on 1st June was estimated as follows :— Winter wheat, 83·8 per cent. compared with 70·9 a year ago, with a probable yield of 587,000,000 bush. as against 418,000,000 bush. last year; spring wheat 95·2 per cent., compared with 91·6 last year, with a probable yield of 344,000,000 bush. as against 232,000,000 bush. last year. The average condition of oats on 1st June was 93·2 per cent. as against 88·8 a year ago, the yield being estimated at 1,500,000,000 bush. as against 1,587,000,000 bush. last year. The condition of barley was estimated at 90·5 per cent. as against 89·3 last year, with a probable yield of 235,000,000 bush. compared with 209,000,000 bush. last year. Rye was placed at 83·6 per cent. against 84·3 a year ago, with an estimated crop of 81,000,000 bush. as against 60,000,000 finally returned last year. (*Broomhall's Corn Trade News*, 8th June, 1918.)

India.—According to the final official forecast the yield of wheat in India for the season 1917–18 is estimated at 47,525,000 qr. as against the previous estimate of 47,960,000 qr. Last year's yield was 47,413,000 qr. The surplus available for export, apart from reserves from 1917, is 8,500,000 to 9,000,000 qr. The total linseed crop is estimated at 507,000 tons from 3,737,000 acres as against a corresponding estimate last year of 520,000 tons from 3,533,000 acres. The total yield of rape seed is estimated at 1,111,000 tons from 6,884,000 acres as against last year's estimate of 1,186,000 tons from 6,507,000 acres. (*The London Grain, Seed and Oil Reporter*, 4th and 7th June, 1918).

Australia.—According to reports from the Weather Observers of the Commonwealth Meteorology Department, conditions during February were on the whole favourable. Rainfall was excessive in some parts and seriously deficient in others, but grass was plentiful even where rather dry, and stock were in good condition except in a few places where the drought had been serious. Harvest was practically completed, and the general yield seemed fairly good, though reports varied greatly. Fruit was good on the whole and the vintage season promising.

Agricultural Conditions in England and Wales on 1st June.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st June, state that May was generally a very favourable month, the increased warmth and sufficient rains bringing the crops on well. In some few areas the month was too dry, and rain would now be welcomed in most parts for the corn crops.

Wheat is mostly looking well, but some of the spring-sown on newly-ploughed grass land has been damaged by wireworm or leather-jackets. Oats suffered more from these pests on newly broken-up pasture, and re-sowing has in several cases been necessary. On old arable land the crops are strong and healthy; and generally they may be described as satisfactory. Barley is also a

satisfactory crop. Beans are good, as are also peas. The area under barley is rather greater than last year ; that under oats is larger than a year ago by nearly a fourth.

Potatoes generally present a satisfactory appearance, and are of good promise. In many areas planting was late, and the main crop is not yet everywhere above ground. The area under this crop is fully 20 per cent. greater than last year.

Mangold sowing was completed under favourable conditions, and the crop is coming up well. In many districts, however, damage is reported from insect pests, and some re-sowing has had to be done. Turnip sowing is going on under satisfactory conditions, but in many districts farmers are waiting for rain. The early-sown crops have been frequently attacked by turnip fly.

Hops developed well during the month, but are still backward in Kent. Aphis attacks are prevalent in all districts, and washing is general ; but the crop is otherwise satisfactory, and, if the fly can be kept under, may be considered promising. The area is rather less than last year.

The prospects for all orchard fruit are very poor, particularly plums (which were badly cut by frost) and pears. Bush fruits are decidedly better ; strawberries should be about average, raspberries over average ; while currants and gooseberries are rather under normal.

The area intended for hay, whether from seeds or meadow, is decidedly less than last year, by nearly 10 per cent. Prospects are good, however, nearly everywhere, and both kinds are expected to yield a little over average ; the best reports coming from the eastern counties.

With the warmer weather, and consequent growth of grass, live stock have made good progress during the month, and are generally in satisfactory condition.

The supply of labour continues deficient, and, in spite of the assistance of soldiers, women, and prisoners of war, there is difficulty in keeping the land clean, but the other work of the farm has generally been done without undue delay. The Whitsuntide hirings showed some further rises in wages.

Agricultural Labour in England and Wales during May.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales :—

Northumberland, Durham, Cumberland, and Westmorland.—Although labour is scarce, particularly as regards skilled men, the situation does not appear to be serious in this respect, as the fine weather has allowed work to be kept well in hand. It is feared, however, that the thinning of the root crops will be difficult to arrange for. Wages were higher at the Whitsuntide hirings.

Lancashire and Cheshire.—The supply of labour is deficient.

Yorkshire.—The supply of labour is deficient, the chief difficulty being as regards horsemen.

Shropshire and Stafford.—Skilled and casual labour are deficient, but with the help of soldiers, women and prisoners of war, work is well in hand.

Derby, Nottingham, Leicester, and Rutland.—Skilled labour is deficient. Wages still tend to increase.

Lincoln and Norfolk.—The supply of labour is deficient, and fields are becoming rather foul. Wages still tend to increase.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is deficient, and hoeing of the crops is often being neglected in consequence.

Bedford, Northampton, and Warwick.—Skilled labour is short, but work appears to be well in hand, as good assistance has been rendered by soldiers, women and prisoners of war.

Buckingham, Oxford, and Berkshire.—Skilled labour is still deficient, but soldiers, women and prisoners of war are becoming more expert. Wages continue to rise in most places.

Worcester, Hereford, and Gloucester.—There is the usual deficiency of labour, but work is kept in hand by soldiers, women, and prisoners of war. Wages tend to increase.

Cornwall, Devon, and Somerset.—Skilled labour is everywhere deficient, and though great assistance has been rendered by women and soldiers the shortage is severely felt. Wages show a tendency to rise.

Dorset, Wiltshire, and Hampshire.—The supply of labour is generally short, but much assistance has been given by women, soldiers and German prisoners. Wages tend to increase.

Surrey, Kent, and Sussex.—The supply of labour is deficient.

Essex, Hertford, and Middlesex.—The supply of labour is deficient, but the assistance received from women and soldiers has saved the position from becoming serious.

North Wales.—The supply of labour, especially skilled, is very scarce in some districts; in others the supply appears to be about sufficient.

Mid Wales.—Labour is deficient, but good weather has made work easier so far.

South Wales.—The supply of labour is very deficient in most districts, and it is feared there will be a great difficulty in obtaining labour for hoeing and harvesting.

Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st June, 1918, certain diseases of animals existed in the countries specified :—

Austria (on the 8th May) Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of March).—Anthrax, Swine Erysipelas.

France (for the period 21st April—4th May).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-scab, Swine Fever.

Holland (month of April).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 8th May).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 29th April—5th May).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,982 outbreaks), Glanders, Rabies, Sheep-scab, Swine Fever.

Norway (month of April).—Anthrax.

Spain (month of December, 1917).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

Sweden (month of April).—Anthrax, Black-leg.

Switzerland (for the period 6th—12th May).—Anthrax, Black-leg, Sheep-scab, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Germany, Montenegro, Rumania, Russia, Serbia.

The Weather in England during May.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.		Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 4th May:								
England, N.E. ...	44·2	−2·5	0·34	9	− 2	2	2·9	−3·0
England, E.	46·7	−1·6	0·23	6	− 4	2	3·0	−3·4
Midland Counties ...	47·1	−0·9	0·44	11	− 1	2	3·8	−1·8
England, S.E. ...	48·5	−0·9	0·50	13	+ 3	3	2·8	−3·8
England, N.W. ...	46·2	−1.4	0·60	15	− 1	2	6·7	+1·0
England, S.W. ...	48·5	−0·1	0·27	7	− 9	3	5·4	−0·6
English Channel ...	50·0	−0·7	0·67	17	+ 4	5	3·4	−3·8
Week ending 11th May:								
England, N.E. ...	47·4	−0·9	0·70	18	+ 7	3	5·0	−1·0
England, E.	50·1	+0·3	0·37	10	0	3	6·1	−0·4
Midland Counties ...	51·0	+1·4	0·49	12	+ 2	2	5·3	−0·5
England. S.E. ...	51·9	+0·9	0·62	16	+ 7	3	6·0	−0·7
England, N.W. ...	50·5	+1·2	0·41	10	− 2	3	6·7	+0·6
England, S.W. ...	51·9	+1·4	0·44	11	− 1	2	6·4	−0·2
English Channel ...	51·8	−0·1	0·47	12	+ 4	2	6·7	−1·4
Week ending 18th May.								
England, N.E. ...	55·0	+5·5	0·63	16	+ 5	3	6·1	−0·1
England, E.	55·4	+4·1	0·47	12	+ 1	2	7·2	+0·6
Midland Counties ...	55·9	+4·6	0·37	10	− 3	3	6·5	+0·5
England, S.E. ...	56·1	+3·9	0·36	9	− 2	3	8·1	+1·0
England, N.W. ...	54·3	+3·6	0·34	9	− 4	3	5·3	−1·3
England, S.W. ...	53·7	+1·8	0·38	10	− 2	4	6·0	−0·9
English Channel ...	55·2	+1·9	0·65	17	+ 7	4	8·1	+0·4
Week ending 25th May:								
England, N.E. ...	59·5	+8·8	0·58	15	+ 3	3	7·8	+1·6
England, E.	58·4	+5·5	0·63	16	+ 5	2	9·4	+2·6
Midland Counties ...	60·0	+7·5	1·03	26	+13	3	8·3	+2·5
England, S.E. ...	60·4	+6·6	0·21	5	− 6	2	9·8	+2·8
England, N.W. ...	58·2	+6·3	1·34	34	+23	4	6·8	+0·4
England, S.W. ...	57·5	+4·5	0·61	16	+ 3	3	8·5	+1·9
English Channel ...	59·7	+5·5	0·63	16	+ 5	2	10·5	+2·7

* 1 inch = 25·4 millimetres.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of May, 1916, 1917, and 1918.

—	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
London ...	54	9	79	3	74	0	51	2	65	10	57	1	33	9	56	0	47	9
Norwich ...	54	1	77	6	73	6	50	7	64	10	55	5	32	10	54	9	44	0
Peterborough	53	8	77	10	73	11	51	5	64	1	56	9	32	6	54	6	43	11
Lincoln ...	55	0	77	6	73	4	54	0	62	0	56	6	32	11	55	1	—	
Doncaster ...	55	8	77	11	73	1	52	7	65	1	56	6	32	4	54	11	—	
Salisbury ...	56	9	77	10	73	2	50	3	65	5	56	1	33	0	54	10	47	7

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.			BARLEY.			OATS.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Jan. 5...	55 8	76 0	71 2	47 8	66 4	58 0	31 5	47 1	45 5
,, 12...	56 7	75 8	71 2	48 6	65 7	58 2	31 11	47 2	46 9
,, 19...	57 2	75 8	71 3	49 6	64 9	58 1	32 6	47 4	47 9
,, 26...	58 0	75 10	71 1	51 0	64 5	58 7	32 11	47 8	48 2
Feb. 2...	58 3	75 10	71 2	52 5	64 0	58 10	32 4	47 3	50 2
,, 9...	57 6	76 0	72 0	52 10	63 5	59 0	32 2	46 11	50 6
,, 16...	56 11	76 3	72 3	53 6	63 8	58 11	31 9	47 3	52 0
,, 23...	58 2	76 9	72 2	54 2	63 9	58 9	32 2	47 8	52 3
Mar. 2...	59 4	77 4	72 2	55 7	64 0	57 9	32 4	48 0	52 0
,, 9...	58 2	78 0	72 3	55 6	63 7	58 5	32 3	48 7	52 2
,, 16...	57 9	78 10	72 4	55 4	64 1	56 10	31 10	49 4	51 0
,, 23...	55 11	80 3	72 3	54 6	65 6	56 9	31 4	50 4	50 3
,, 30...	53 6	81 5	72 4	53 8	71 10	56 7	30 5	51 10	48 10
Apl. 6...	51 8	84 4	72 11	53 7	69 11	56 7	30 1	55 1	49 10
,, 13...	53 2	85 2	73 3	53 1	71 10	56 6	30 7	57 2	47 2
,, 20...	55 3	84 10	73 3	52 10	70 6	56 6	31 8	59 8	47 0
,, 27...	56 3	81 1	73 3	53 5	69 5	56 10	32 4	58 6	46 8
May 4...	55 7	77 7	73 5	53 1	64 4	56 5	32 10	54 9	47 4
,, 11...	55 5	78 0	73 5	53 5	64 11	56 6	33 1	55 2	47 6
,, 18...	55 0	77 11	73 4	52 10	64 10	56 6	33 0	55 2	46 4
,, 25...	54 7	78 0	73 3	52 9	64 9	56 6	33 4	54 11	47 8
June 1...	53 3	78 0	73 8	53 9	65 11	60 0	33 3	54 11	44 9
,, 8...	51 2	78 0	73 11	52 8	67 7	59 2	32 7	55 0	45 5
,, 15...	48 10	78 2		50 9	75 6		32 1	55 1	
,, 22...	47 6	78 1		49 10	75 0		31 3	55 2	
,, 29...	46 3	78 3		49 1	73 11		30 10	55 1	
July 6...	46 3	78 1		45 6	69 5		30 8	55 2	
,, 13...	48 11	78 2		47 5	70 10		31 6	55 1	
,, 20...	51 6	78 3		48 8	72 1		32 3	55 2	
,, 27...	53 5	78 3		47 2	65 7		32 5	55 2	
Aug. 3...	55 1	78 2		46 1	73 6		32 9	55 0	
,, 10...	56 7	78 4		46 11	76 1		31 2	55 0	
,, 17...	58 1	78 7		48 0	68 11		30 8	55 6	
,, 24...	59 0	76 7		47 1	70 7		31 6	54 7	
,, 31...	59 4	72 1		48 5	60 4		30 5	49 0	
Sept. 7...	59 3	71 6		51 7	59 3		31 1	46 7	
,, 14...	59 11	70 7		52 6	57 2		30 9	45 0	
,, 21...	59 4	70 8		53 3	56 10		30 9	45 8	
,, 28...	58 10	70 6		54 1	58 5		31 1	44 7	
Oct. 5...	59 2	70 8		54 5	57 9		30 9	44 9	
,, 12...	59 7	71 0		53 10	58 5		31 6	44 5	
,, 19...	60 9	70 8		53 8	59 3		31 11	44 1	
,, 26...	62 10	70 10		54 6	60 1		32 10	43 0	
Nov. 2...	66 7	70 4		56 2	59 11		34 0	42 4	
,, 9...	69 8	70 3		58 0	60 2		35 8	42 11	
,, 16...	70 9	70 3		59 8	60 2		37 8	43 0	
,, 23...	70 8	70 2		61 8	59 9		39 7	43 1	
,, 30...	71 3	70 2		63 1	59 3		41 4	44 6	
Dec. 7...	72 1	70 7		65 6	58 7		44 1	43 5	
,, 14...	73 2	71 2		66 5	58 0		45 10	43 6	
,, 21...	74 8	71 1		67 3	57 7		46 5	44 2	
,, 28...	75 10	71 1		67 5	57 7		47 4	44 10	

NOTE.—Returns of purchases by weight or weighed measure are converted to *Imperial Bushels at the following rates*: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES OF LIVE STOCK IN ENGLAND AND WALES in May and April, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	May. First Grade.	May. Second Grade.	April. First Grade.	April. Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle : –	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	75 2	70 0	75 3	70 0
Herefords	75 4	70 1	75 5	70 2
Shorthorns	75 2	70 0	75 2	70 0
Devons	75 2	70 0	75 3	70 2
Welsh Runts	—	—	75 0	—
Fat Cows	70 0	62 2	70 0	62 1
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	17	14½	18	15¾
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	50 2	38 12	51 12	39 11
,, —Calvers ...	45 7	35 19	47 7	37 2
Other Breeds—In Milk ...	50 3	36 16	46 4	37 6
,, —Calvers ...	37 0	30 5	29 0	36 10
Calves for Rearing	4 8	3 5	3 18	3 0
Store Cattle :—				
Shorthorns—Yearlings ...	18 4	15 6	18 4	15 4
,, —Two-year-olds...	28 4	23 7	28 9	23 14
,, —Three-year-olds	38 5	32 9	38 18	33 5
Herefords—Two-year-olds...	32 5	27 10	33 4	27 18
Devons— ,,	31 11	27 12	29 14	24 16
Welsh Runts— ,,	27 10	23 11	28 17	24 7
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	81 5	68 8	80 5	66 5
Store Pigs :—				
8 to 12 weeks old	67 9	51 4	59 2	45 5
12 to 16 ,, ,, ...	101 1	82 3	95 2	79 3

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during May made prices equivalent to an additional 1¾*d.* per lb. of the carcass weight for Downs and Cross-breds, 1*d.* for Longwools, 1½*d.* for Cheviots and Blackfaced, and 1¾*d.* for Welsh, and during April 1¾*d.* per lb. for Downs, Longwools, Cheviots and Blackfaced, and 1¼*d.* for Welsh and Cross-breds.

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in May, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	—	—	—	—	178 0	—
			120 lb.		120 lb.	
Cheshire	—	—	188 0	—	190 0	—
			per cwt.		per cwt.	
Canadian	130 6	—	130 6	—	130 6	—
BACON :—						
Irish (Green)	—	—	197 0	—	—	—
Canadian (Green sides)	177 6	—	177 0	—	178 0	175 6
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	36 5	34 4
Irish	34 11	—	34 1	32 11	35 2	34 0
Egyptian	19 10	18 10	18 9	17 6	23 0	22 0
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	157 6	147 6	128 6	123 6	166 0	156 0
Edward VII.	156 0	148 6	140 0	134 6	166 0	156 6
Up-to-Date	161 0	152 0	129 0	124 0	150 0	140 0
HAY :—						
Clover	—	—	—	—	157 0	150 6
Meadow	—	—	—	—	157 0	150 6

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in May, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	114 6	114 6	—	114 6	114 6
	2nd	114 6	114 6	—	114 6	114 6
Cow and Bull	1st	114 6	114 6	114 6	114 6	114 6
	2nd	114 6	114 6	96 0	111 6	101 6
Irish : Port Killed ...	1st	—	—	114 6	—	114 6
	2nd	—	—	109 6	—	114 6
Argentine Frozen—						
Hind Quarters ...	1st	129 6	129 6	129 6	129 6	129 6
Fore ,, ...	1st	99 0	99 0	99 0	99 0	99 0
Argentine Chilled—						
Hind Quarters ...	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
Canadian Frozen—						
Hind Quarters ...	1st	—	—	—	129 6	—
Fore ,, ...	1st	—	—	—	99 0	—
VEAL :—						
British	1st	—	—	113 6	114 6	114 6
	2nd	—	113 0	92 6	101 6	95 0
Foreign	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	121 6	121 6	121 6	121 6	121 6
	2nd	121 6	121 6	121 6	121 6	121 6
English	1st	121 6	121 6	—	121 6	121 6
	2nd	121 6	121 6	—	121 6	121 6
Irish : Port Killed ...	1st	—	—	121 6	—	121 6
	2nd	—	—	121 6	—	121 6
Argentine Frozen ...	1st	121 6	121 6	121 6	121 6	121 6
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	—	—	—	—	121 6
	2nd	—	—	—	—	121 6
New Zealand	1st	—	121 6	—	121 6	—
Australian...	1st	—	—	—	—	—
Argentine...	1st	121 6	121 6	121 6	121 6	121 6
PORK :—						
British	1st	—	149 6	149 6	149 6	—
	2nd	—	149 6	—	149 6	—
Frozen	1st	—	—	—	149 6	—

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

Disease.	May.		Five Months ended May.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	15	39	128	268
Animals attacked	16	41	144	304
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	1	1	14	11
Animals attacked	2	1	38	20
Parasitic Mange:—				
Outbreaks	335	188	2,572	1,388
Animals attacked	629	312	4,952	2,835
Sheep Scab:—				
Outbreaks	11	20	233	368
Swine Fever:—				
Outbreaks	172	288	495	1,128
Swine slaughtered as diseased or exposed to infection	53	127	167	471

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

Disease.	May.		Five Months ended May.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	—	—	1	2
Animals attacked	—	—	1	2
Foot-and-Mouth Disease:—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked ...	—	—	—	1
Parasitic Mange:—				
Outbreaks	10	7	67	23
Sheep-Scab:—				
Outbreaks	13	17	164	210
Swine Fever:—				
Outbreaks	—	16	7	124
Swine slaughtered as diseased or exposed to infection	—	113	27	855

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EDITORIAL NOTES.

Agricultural Reconstruction.

AGRICULTURE has been the subject of a continuous series of Royal Commissions and Committees ever since the great depression set in at the close of the 'seventies of last century. The difficulty the supporters of agriculture always experienced on these occasions was to secure any general acceptance of their principle that a prosperous agriculture was so essential to the national life as to justify any departure from the economic theories then current concerning the relations of the State to industries. The pressure of the War has made food production a necessary element in national policy, and our own land must be made to do its maximum towards supporting its people. The farmer must be insured against the risk of the losses to which intensive cultivation is liable if the markets are dominated by foreign supplies. Not only must the farmer be insured, but the labourer must be guaranteed a living wage, and, as a necessary corollary, if the State is to assume a liability in order to render the holding of land a reasonably remunerative enterprise it must take powers to enforce a corresponding standard of production. The occupier of land must use it in the national interest. These are the principles embodied in the Corn Production Act, and are the basis of the operations of the Food Production Department and its delegates—the Agricultural Executive Committees.

The considered argument for the Corn Production Act may be read in the First Report of Lord Selborne's Sub-Committee of the Reconstruction Committee, though that Report did not appear until after legislative action had been taken. The changed relations between the State and Agriculture, however, do not end with the Corn Production Act, and many other reforms are necessary if the State is to be charged with

the duty of ensuring the greatest production from the land. The final part of the Report of Lord Selborne's Committee may be regarded as a survey of this further field. Its recommendations cover the whole ground of the reconstruction of our agricultural system as far as such reconstruction can be effected by legislation or departmental action. The questions are so various and so intricate, and many of them are still so dependent upon the conditions in which the country may find itself at the close of the War, that it is not to be expected that Lord Selborne's Committee could have completely explored all of them and arrived at conclusions which will be universally acceptable. Nevertheless a solution is put forward, together with the grounds upon which it is based, and for many years to come this Final Report of the Agricultural Policy Sub-Committee of the Reconstruction Committee must remain the text upon which discussion and action will be based. The Report therefore demands the closest study from all classes who are interested in agriculture and in increased food production.

The Report is too voluminous to be dealt with fully here, but the summary of the subjects it covers and the selected passages given at p. 385 afford some idea of its contents.

Labour and Food Supply.

ONE of the most striking features of agricultural England to-day is the change in agricultural labour brought about by the War. Tens of thousands of farm workers have joined the Forces, horses are reduced in number, the labour of ploughing is increased and is being largely carried out by tractors, and a great amount of work is being done by women, soldiers, volunteer workers, school boys, and prisoners of war. The latest arrangement at the time of writing this note is that relating to War Agricultural Volunteers (see p. 467), and the hope may be expressed that a very large number of such men will be found to have enrolled.

Women and the Harvest.

THE Prime Minister's appeal to women (see p. 466) to join the ranks of farm workers to save the coming harvest will not fall on deaf ears, for it is quite certain that very much depends on women's labour in the harvest field, where the work done will rank with that of munition workers as of the utmost national importance. The excellent work done by women

on the land has formed the subject of many notes published from time to time in this *Journal*, including one or two notes in the present issue (see p. 455).

National Institute for Agricultural Botany.

AT a Meeting of the Incorporated National Association of British and Irish Millers, held at the Cannon Street Hotel on 27th June, the Rt. Hon. R. E. Prothero, M.P., President of the Board of Agriculture and Fisheries, referred to the need for producing suitable varieties of wheat and other cereals for growing in the United Kingdom. To this end it was desirable to establish a National Institute for Agricultural Botany on the commercial side, working in association with the Institute for Plant Breeding presided over by Professor R. H. Biffen. The object would be to ensure that as a useful variety of cereals was established, it could be handed over to the commercial side to be brought out on commercial lines through the seed agents. This would greatly accelerate the placing on the market of new varieties of cereals. The meeting was also addressed by Sir A. Daniel Hall, K.C.B., F.R.S., Secretary to the Board of Agriculture and Fisheries, by Professor R. H. Biffen, F.R.S., by Mr. Lawrence Weaver, C.B.E., and by Mr. A. E. Humphries, President of the Association. It was resolved that the Association should contribute £5,000 towards the endowment of the suggested institute of agricultural botany.

Seed Testing.

BY an Order made last year by the Food Controller, sellers of agricultural seeds were at last required to declare the purity and germination of seeds offered for sale. Such action had been advocated for many years, and may be regarded as a reform of considerable importance to food production. As was anticipated, very beneficial results have been secured. The Order of 1917 has now been replaced by the Testing of Seeds Order, 1918 (see p 477), which effects certain changes, the most important of which is that cereals are brought within the scope of the Order, whilst an innovation of considerable interest is that packets of vegetable seeds of certain weight must reach a prescribed standard of germination, failing which the fact must be declared at the time of purchase. Farmers should take advantage of the provisions of the Order, an account of which is given in Food Production Leaflet No. 47.*

* Copies of this leaflet can be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1, together with a copy of Leaflet No. 297 (*Seed Testing*).

British Agriculture as a Business Proposition.

THE address by Mr. Guy to the Agricultural Club (printed at p. 402) will well repay the close study of farmers, for with characteristic American energy it deals with several problems which require solving before British agriculture can be placed upon that sound basis of reconstruction to which we all look. It is hoped that other papers read before the Club will find a place in this *Journal.*

War-Time Farming Problems.

ATTENTION is directed to the article by Mr. Oldershaw on "War-Time Farming Problems," which deals with various problems which have come before the War Agricultural Executive Committee for the County of Suffolk. This article should be useful to other County Executive Committees who may be faced with somewhat similar difficulties in the course of their work, and who may be interested to know how they have been met elsewhere.

Weeds as Food.

IN recent issues (March, 1918, p. 1441, and June, 1918, p. 330) of this *Journal* notes have been published on the value of the rhizomes or creeping rootstocks of couch grass as a food for stock. In the present issue are reprinted notes from the *National Food Journal* on certain fodder substitutes (see p. 448), including heather, bracken, seaweed, and reeds, while bracken and heather were also the subject of a note on p. 233 of the May issue. The value of spurrey for forage was dealt with in this *Journal* in July, 1911, p. 292, March, 1912, p. 1020, and June, 1912, p. 212. Wherever this weed occurs in such profusion that it practically overruns the sown crop, as it occasionally does, depasturing the crop with sheep, which will also clear up the spurrey, may be very beneficial—more particularly on light soils, where this weed usually occurs. Animals have also been observed to browse upon Charlock (*Brassica Sinapistrum,* Boiss), Fat-hen or Pig-weed (*Chenopodium album,* L.) Redshank or Persicaria (*Polygonum Persicaria,* L.), and other weeds. Persicaria is stated to be a nutritious plant and has been given to horses and cattle as a green fodder. The Water Crowfoot (*Ranunculus aquatilis,* L.) is stated also to have been fed to horses and cattle, and been found very useful. Henslow remarks that cattle eat it with impunity, and that on the borders of the Avon cottagers used to support their cattle

almost entirely on it: "one man kept four cows and a horse so much upon it that they had not consumed more than half-a-ton of hay throughout the whole year."

Loss of Farm Produce by Fire.

THE Joint Committee of the Board and the Ministry of Food recently directed attention to the possible loss of farm produce by fire, and warned farmers to exercise great care as to the position of ricks. Hay will mostly have been saved before this issue of the *Journal* appears, but the corn harvest is upon us and the position of stacks will be under consideration. General convenience commonly leads to the larger proportion of corn crops finding a place in a rick-yard. This has one drawback; in case of fire the whole group of stacks may be lost. It is more than ever important that the risk of such loss should be minimised, and the best plan is to stack the corn in different parts of the farm, as far apart as possible, at least 60 yards from a railway line, road or chimney, and near ponds if such exist.

AGRICULTURAL RECONSTRUCTION.

THE Agricultural Policy Sub-Committee of the Reconstruction Committee appointed by Mr. Asquith, then Prime Minister, in August, 1916, to consider and report upon the methods of effecting an increase in the home-grown food supplies, having regard to the need of such increase in the interests of national security, have just issued their Report (Cd. 9079, 1918). An Interim Report (Cd. 8506, 1917) was issued early in 1917, and was the subject of an article in the issue of this *Journal* for April, 1917.

The Committee was constituted as follows:—The Right Hon. The Earl of Selborne, K.G., G.C.M.G. (*Chairman*), Sir Charles Bathurst, K.B.E., M.P.,* Mr. C. M. Douglas, C.B., D.Sc., The Right Hon. Sir Ailwyn Fellowes, K.C.V.O., Mr. W. J. Fitzherbert-Brockholes, C.B.E., Sir Daniel Hall, K.C.B., F.R.S., Mr. W. A. Haviland, Mr. C. Bryner Jones, M.Sc., The Right Hon. R. E. Prothero, M.V.O., M.P.,* Mr. G. G. Rae, C.B.E., The Right Hon. G. H. Roberts, M.P.† The Hon. E. G. Strutt, and Sir Matthew Wallace, with Mr. H. L. French,

* Appointed in his capacity as a member of the Committee on Commercial and Industrial Policy.

† Resigned in February, 1917, owing to his Departmental duties making it impossible for him to attend the meetings of the Sub-Committee.

O.B.E., of the Board of Agriculture and Fisheries, and Mr. Alexander Goddard, the Secretary of the Surveyors' Institution, as Joint Secretaries.

The Most Rev. Dr. Kelly, Lord Bishop of Ross, and the Right Hon. Sir Horace C. Plunkett, K.C.V.O., F.R.S., were appointed by the Prime Minister in November, 1916, to represent Irish interests on the Sub-Committee.

The Report is a full exposition of the position of agriculture in this country. It opens with an historical preface in which is given a brief survey of the agricultural conditions during the last 100 years and the political and social factors exercising an influence on those conditions, and then proceeds to deal in detail with the various problems connected with British agriculture. A number of more or less drastic recommendations are made by the Committee with the object of ensuring agricultural reconstruction.

The subjects dealt with include :—

(1) Effects of the agricultural depression ; (2) Need for a new agricultural policy : (3) Agricultural wages ; (4) Price of wheat and oats ; (5) Effect of guaranteed prices on rents ; (6) Method of securing increased production ; (7) Sugar beet ; (8) Scope and limitation of the inquiry ; (9) The departments of agriculture ; (10) Organisation and co-operation ; (11) Agricultural credit ; (12) Small holdings, ownership, and tenancy ; (13) Village reconstruction, industries, and rural life ; (14) Tithe redemption ; (15) Local taxation ; (16) The Agricultural Holdings Act ; (17) Reclamation and drainage ; (18) Deer forests ; (19) The elimination of pests and weeds ; (20) The supply of artificial manures ; (21) Weights and measures ; and (22) Transport.

It is not proposed to give here a resumé of the whole of the Report, but it is thought that the following verbatim abstracts of some of the principal parts will give some idea of the Committee's views and recommendations, and speak for themselves :—

Introduction.—" 2. We desire at the outset to explain that we were informed that the question asked us did not refer to war but post-war conditions, and our Report is drawn up from that point of view only. Nevertheless, it is evident that for some time after the War agriculture must be seriously affected by the conditions which have prevailed during the War. Any inducements and assistance, which the farmers receive now to keep their fields cultivated, or to cultivate additional land will bear fruit in the post-war period, and may even be considered as direct steps towards the object we have in view. We trust, therefore, that we shall not be considered to hav

passed beyond our legitimate subject when we express our conviction that farmers need and deserve all the help and encouragement which His Majesty's Government can possibly give them at the present time.

"3. The experience of the War has shown that the dependence of the United Kingdom on imported food has already involved the country in special difficulties, and in the future may become a source of real danger. We have found that it has increased the cost of the War; aggravated the difficult problem of regulating foreign exchange; and absorbed an undue proportion of the tonnage of the mercantile marine at a time when its services have been so sorely needed for other purposes. We are conscious also of the possibility of a development in the construction of submarines which in a future war might make impossible a continuous supply of food to the people of the United Kingdom from overseas. We hope and pray that the greater sanity of nations and their increased obedience to the Divine law may save our country from any repetition of the hideous catastrophe which has to-day overwhelmed Europe, but we can feel no positive assurance that this will be the case, and we do not think that we should be faithful to our trust for our descendants if we omitted to take any practicable measures to increase the national safety in a future time of need. We can well imagine that in some future struggle the comparative independence of the United Kingdom of a supply of food from overseas might be a determining factor of victory. Apart from these grave considerations, it is evident that, after the War, the financial and physical welfare of the country will demand that the productive capacity of the soil should be developed to the fullest extent. Burdened with a huge debt, the nation will be strongly interested in producing as much as possible of its food at home, in order that it may buy as little as possible abroad. Exhausted in man power, it will find in the expansion of the rural population of these islands the best restorative of its vitality and creative energy.

"4. We have approached the problem entrusted to us exclusively from the point of view of national security and welfare, and we have endeavoured to formulate a scheme of agricultural policy which may be generally accepted by the nation and adhered to through a long course of years."

Need for a New Agricultural Policy.—"16. We are confident that, as the years pass by and agriculture becomes more intensive in the United Kingdom, an increase of production will be reached which would now appear impossible to many

farmers, and that, if the agricultural policy which we recommend is carried out steadily and continuously, a great change will be effected within a generation.

"17. Nothing in agriculture can be done by the wave of a magician's wand. Results can only be produced in the United Kingdom as in Germany by a constant and consistent policy. The State must adopt such a policy and formulate it publicly as the future basis of British agriculture, and explain to the nation that it is founded on the highest considerations of the common weal. It must be explained to landowners, farmers, and agricultural labourers alike that the experience of this War has shown that the methods and results of land management and of farming are matters involving the safety of the State, and are not of concern only to the interests of individuals. They must be plainly told that the security and welfare of the State demand that the agricultural land of the country must gradually be made to yield its maximum production both in foodstuffs and in timber.* The history of our country shows that, when once the path of duty is pointed out to them and they understand how grave is the responsibility put upon them, neither landowners, nor farmers, nor agricultural labourers will fail to rise to the emergency.

"18. There is much excellent estate management and much high farming in the United Kingdom to-day, but there is also much slack estate management and bad farming, or management and farming which, while profitable to the persons interested, do not take national requirements as to food production into account. That this is so is known to all who have studied the present conditions of British agriculture. The causes of bad estate management and farming are lack of suitable education or of capital (often found in combination) on the part of landowners and farmers, the personal equation of character, the excessive encouragement of game, the acquisition of land for the sake only of its amenities, and the conviction that the State has no interest in the treatment of agricultural land and that it is the concern only of the individuals dependent upon it.

"19. The general average of farming must be steadily and continuously raised throughout the United Kingdom; the grass land and the arable land alike must be more intensively cultivated; the improvement of live stock, for which landowners and farmers have done so much even through the years of acute

* The subject of Forestry was referred to another Sub-Committee of the Reconstruction Committee. (See this *Journal*, February, 1918, p. 1251.)

depression, must be progressive; much grass land must be reconverted into arable; the sugar beet industry and the manufacture of potato products can be introduced into British agriculture to its great advantage; estates must be managed with a single eye to *maximum* production; capital must be attracted to the industrial equipment and improvement of the land and to the operations of intensive farming; agricultural labourers must be provided with an adequate supply of good cottages; small holdings both of owners and of occupiers must be fostered to provide a 'ladder' for the agricultural labourer and for the demobilised sailors and soldiers; the organisation of agriculture must be developed; the country must be permeated with a complete system of agricultural education; the status of the department of agriculture must be improved and their powers enlarged and reinforced by association with existing agricultural and administrative bodies, both national and local. All these questions and others of much importance, such as Reclamation, the incidence of Local Taxation, Credit, the working of the Agricultural Holdings Act, etc., etc., will be dealt with in our Report, which will present a scheme of agricultural policy as one whole; but we think it our duty to put in the forefront our conviction that a basis of security and stability of the conditions under which agriculture is to be carried on in the future must be the foundation of the whole structure, and that without it the increase of production, which we predict, cannot be realised.

"20. We are of opinion that the conditions of agriculture must be made so stable that out of its profits the agricultural labourer can be assured a fair wage, the cultivator of the soil a fair return for his capital, energy, and brains, and the landowner a fair return for the capital invested in the land, and we believe that this stability can never exist so long as there is a possibility of a recurrence of the prices of the late period of depression.

"21. We recommend that the State should fix a minimum wage for the ordinary agricultural labourer in each county, guarantee to the farmer a minimum price for wheat and oats, and take steps, as set forth in later paragraphs, to secure the increase of production which is the object of the guarantee. The cereal crops are the pivot of agriculture, and we do not consider that dairy and stock farming will in any way be prejudiced by our proposals. Moreover, as we have already stated, these very important branches of the agricultural industry can be more, not less, advantageously conducted on

arable land than on grass land. In the United Kingdom there is land so adapted to pasture that its retention in grass can be defended on economic grounds. There is also grass land the soil of which is a clay so sticky that in the climate of these islands under the plough 'season can only be got upon it' once in three or four years; and there is other land where the climatic conditions render the harvest precarious. It would be useless to plough such land. Of the remaining grass land a large proportion could be ploughed up with advantage to the farmer, the landowners, and the State. The interests of the State demand that more land should be put under the plough, and any landowner and dairy or stock farmer, who chooses to convert part of his grass land into arable, could at once obtain the benefit of the guarantee and at the same time increase the output of his particular products.

"22. We have no authority to consider the fiscal policy of the country as a whole; our reference, though a very important one, is strictly limited, and we shall confine our Report to an answer to it. At the same time we think it right to put on record our opinion that, if the State, for reasons of general policy, were to adopt a tariff on manufactured goods, then a tariff corresponding in degree (with the necessary differentiations between the products of the Empire, of allied, and of other countries) should be imposed on imported foodstuffs such as dairy produce, meat and corn, and that special consideration should be shown to the produce of the more intensive forms of agriculture (of which fruit and hops and flax may be cited as examples), where the capital invested, and the annual expenditure in cultivation, and the proportion of that expenditure on labour, are particularly large."

Method of Securing Increased Production.—"52. The Government has no fairy touch which will enable it to produce instantaneous results. It must work through, and by means of, the men who are now holding and cultivating the land. If it was so foolish as to try and do their work as well as its own, the only result would be to bring agricultural production to a standstill. There is no body of men in existence except the farmers of the United Kingdom and those who have qualified, or who are qualifying, to become farmers, who are capable of farming the land. Technical knowledge based on experience is just as essential for successful farming as education and brains and capital. It is when all these qualifications exist in combination that the best farming is found. Therefore the State must give time to all concerned to adjust themselves

to the new conditions dictated by considerations of national safety. It should formulate its policy and explain the reasons for it in simple definite terms; it should make clear the part it proposes to play itself, that the policy explained will be steadily and consistently followed, and that, while the policy is being worked out, the agricultural industry will not be subjected to any harassing legislation. The State must, in short, take every means in its power to give confidence and a sense of stability to landowners, farmers and agricultural labourers. It must then tell those classes exactly what is expected of them, and appeal to their highest instincts of patriotism to put personal predilections aside, and to unite to carry out a policy on the success of which the safety of their country may some day depend. The standard set before their eyes should be the highest—not to be content till the whole soil of the United Kingdom is producing the greatest possible return of foodstuffs or of timber. It must be clearly understood that henceforth bad farming is a danger to the State, and that the waste of good land on game or games is inconsistent with patriotism. There will be plenty of room for game or golf in moderation, but too much game, or golf links carved out of fat land, make an inroad on the production of foodstuffs which can no longer be defended. Rabbits must be recognised to be what they are, a curse to both agriculture and forestry. There are localities where the rabbit defies extermination, but the effort to deal with the pest should never be intermitted. The theory in fact should be that rabbits are only to be tolerated in completely enclosed spaces, where the ground is of such a nature that it can more advantageously be devoted to the production of rabbits than of any other foodstuffs.

"53. When all this has been explained to them, landowners and farmers should be informed that they will be given reasonable opportunity to adjust themselves to the new conditions. The agricultural labourers being secured their share of profits by the institution of a minimum wage, the landowners and the farmers may be left to adjust their shares between them and also to come to an agreement (which is essential) about the relaxation of covenants against the ploughing of grass land or of any others which tend to discourage good farming. We are satisfied that they will have no difficulty in doing so much more satisfactorily than the State could for them.

"54. We entertain no doubt that landowners, farmers and agricultural labourers alike will realise the greatness of the

trust reposed in them, that they will rejoice at the recognition of the fundamental importance of agriculture to the national life, and that they will do all, and more than all, that their country demands of them. But we recognise that, when once the State has embarked on such a policy as we recommend, for the sake of the nation's safety, it can run no avoidable risk of its failure. Neither the idiosyncrasies, nor the incapacity, nor the lack of patriotism of individuals can be allowed to interpose even a partial barrier to the success of a national policy. . . . ."

Board of Agriculture to have Power to take over Management of Estates.—" 56. We recommend that the Board of Agriculture* should be empowered temporarily to supersede the landowner in the management of the estate for all purposes essential to agriculture. It should put the estate, or such portion of the estate as it might deem necessary (except the mansion and the garden and park, if any, attached to the mansion), into the hands of a manager whose salary should be fixed by the Board of Agriculture and made a charge upon the estate. He should have the same powers in respect of the management of the agricultural land included in the estate as the owner had, and he should manage the estate as trustee for the owner. He should be a man of proved experience and capacity in the management of an agricultural estate, and he should render a yearly report and statement of accounts to the owner and to the Board of Agriculture. The balance of income, if any, derived from the estate after the payment of the necessary outgoings should be remitted half-yearly to the owner by the Board of Agriculture. When once the management of an estate had been so taken over by the Board of Agriculture, it should retain that management for five years, unless within that period there had been a successor in title to the original owner, in which case the estate should be handed back to his management at the end of the current farming year, if he so desires it and is prepared to accept such liabilities as may have been incurred in connection with it. If there had been no change of ownership within that period, the Board of Agriculture should be empowered to hand back the estate to the original owner at its termination if it was satisfied that the future management of the estate would be satisfactory. If it was not so satisfied, then it would continue to manage the estate for another quinquennial period, and so on from five years to five years, until there had been a change

* The Board of Agriculture and Fisheries for England and Wales; and for Scotland the Board of Agriculture, Scotland.

of ownership. The owner should, throughout, be undisturbed in the exercise of sporting rights over the estate, subject to the power of the manager of the estate to prevent those sporting rights being exercised in a manner detrimental to agriculture or forestry. If the owner of such an estate is unable or unwilling to develop it for the purpose of agricultural production, the Board of Agriculture should have the power to borrow from the Land Commissioners and to develop it for that purpose by the expenditure of capital, the charges for which (interest and sinking fund) should have priority over all existing charges on the land charged according to the principle embodied in the Improvement of Land Act, 1864. During the period of supersession the power of the owner to make any fresh charges on the estate, or part of the estate, should be suspended, and the existing charges on it, whether by way of mortgage or of settlement, should be paid out of the proceeds of the land by the Board of Agriculture.

"57. For the guidance of all concerned it should be laid down that it shall be the duty of every landowner so to manage his estate, and that it shall be an implied condition in every lease or tenancy agreement, that the tenant of agricultural land shall cultivate the same according to the approved practice of the best agriculture, with a view to the economic production in the interests of the community of the greatest amount of food-stuffs (for man or beast), of which the land, having regard to its quality and position, is reasonably capable.

"58. Where land is being badly farmed by a tenant who holds a lease, and who persists in farming badly after being duly warned of the ultimate consequences, the landowner may bring the case before the Board of Agriculture, at the same time giving formal notice of the action to the tenant. The Board should thereupon ask the local panel to appoint assessors resident in another county than that in which the farm is situated to report upon the farm, and in due course should refer their report to the Review Committee. If, as the result of the unfavourable nature of the report in respect of the farming of the land, the Review Committee so recommended, then the Board of Agriculture should be empowered to call upon the landowner to give twelve months' notice to the tenant to quit, and that notice should have effect as if the tenant had held no lease, but was a tenant holding on a yearly agreement.

"59. In the later part of our Report we shall deal with agricultural organisation in all its aspects, but it is advisable to state here that in our opinion the Agricultural Department

in each county should, in carrying out the duties described in paragraphs 54 to 58 of this part, act in constant consultation with a National Agricultural Council or Board, which we hope may be formed so as to represent the progressive agricultural thought of the country and fulfilling analogous functions to those attributed to the German Agricultural Council by Mr. Middleton in 'The Recent Development of German Agriculture.'"

Rural Cottages.—"61. The provision of good cottages for agricultural labourers with ample gardens attached to them was an urgent question before the War. We desire to impress upon His Majesty's Government with the greatest emphasis at our command that there can be no hope of a satisfactory development of agriculture as long as the demand for cottages remains unsatisfied. The provision of these cottages should be taken in hand without a moment's avoidable delay after the War. In another part of our Report we shall deal with the improvement of the amenities of rural life, the reconstruction of stagnant villages, and the provision of an agricultural 'ladder' for the labourers by means of smallholdings. We mention these subjects now lest it should be supposed that we consider that the interest of the labourer in a national agricultural policy is limited to the questions of wages and housing.

"62. Our attention has been directed to the point that some amendment in the Settled Land Acts may be desirable to allow a share of the proceeds of the sale of a portion of a settled estate, to be expended on improvements other than those specified in the existing Acts. . . . . "

Need for Technical Advice.—"63. To bring about the changes in farming which we contemplate it will be necessary for the State, in addition to providing farmers with security against loss, to place at their disposal the best available scientific and practical advice. Indeed, it will be impossible to carry out the scheme (except with serious loss and wastage) unless it is accompanied by an important development of the facilities at present available in the United Kingdom for agricultural education, technical advice, and research. It will be necessary to insist on the importance of drainage, and to demonstrate throughout the country the best means of converting grass land to arable, the best methods of manuring, and the best varieties of seed; and to carry out on a much more complete system than has hitherto been attempted demonstrations devised to show that increased production can be secured without loss of profit. These subjects are, however, of such importance that we are deferring their consideration until the later part of our Report."

Organisation and Administration of the Departments of Agriculture. —" 106. The first thing necessary after the War will be to unite the whole Department under one roof. Proper administration is quite impossible when a Department is scattered into a dozen separate houses in half-a-dozen different streets. The Minister in charge of the Department should be styled, as now, President of the Board of Agriculture, but his salary and status should be raised to an equality with that of the President of the Board of Trade and the President of the Local Government Board. The staff must be increased and strengthened; especially it needs the infusion of a proper proportion of Class 1 of the Civil Service; those members of the staff, from whom expert, or at any rate practical, knowledge is required, should be selected by a combination of the systems of nomination and examination; the First Division men, who enter through the Civil Service examination should spend at least two out of the first five years of their service out of London; it is in our opinion important that they should get an early insight into the working of agricultural administration, either on the provincial staff of the Department or attached to the staff of local authorities. The provincial staff of the Department requires reorganising. Before the War the work of most of the provincial officers covered an impossibly large area, but many fresh appointments have since been made in connection with the campaign for food production; in some cases officers may be made responsible for all the work of the Board in a given geographical area; in other cases the work of officers must be specialised. In this paragraph of our Report we merely indicate the fact that the staff of the Department must be permanently expanded above its pre-war strength. In subsequent paragraphs we shall explain what the work is which in our opinion it should do. It may, however, be convenient in this place to draw attention to the fact that the work of other Departments of the State must affect the welfare of the rural population and the state of agriculture. This is particularly true of the Board of Education, and of the Local Government Board in respect of the housing problem. It seems to us necessary that in dealing with rural housing the Local Government Board, and in dealing with elementary and secondary education in agricultural districts, the Board of Education should work in close touch with the Board of Agriculture. The organisation of the Department in London must be remodelled in the light of experience and in consequence of its increased responsibilities. There is, however, one aspect of

this re-organisation to which we wish to draw special attention. It will certainly be necessary to create a Division charged with the management of all agricultural properties permanently or temporarily placed under the control of the Board of Agriculture. But the President of the Board, in his capacity of a Commissioner of Woods and Forests, is already responsible for the management of the agricultural properties of the Crown. We think that it would be a good plan to amalgamate the Agricultural side of the Office of Woods and Forests with the Management Division of the Board of Agriculture, and to put both sets of agricultural properties under the same control.

"107. As in Scotland, so in England and Wales, the War Agricultural Committees of the County Councils* should be replaced by statutory committees, which, when constituted, should have powers of action independently of the County Councils, as in the case of the corresponding Committees in Ireland and of the Education Committees in England. They should be composed of men and women who are not members of the County Councils as well as of members of the County Councils, but in both cases alike it is essential to secure the services of persons with practical knowledge of agriculture or some other branch of rural economy, or representative of some special rural interest rather than of the different districts of the county. These Agricultural Committees should absorb the work of the existing Small Holdings and Allotments Contagious Diseases of Animals, and Agricultural Educatio Committees (or Sub-Committees) of the County Councils, an of the Live Stock Committees established by the Board c Agriculture in various counties within the last few years (a of which Committees should be abolished), and they shoul undertake any other duties entrusted to them by Parliame or delegated to them by the Board. A County Council shou have the power to set up more than one Agricultural Committ within its area, and the Agricultural Committee should ha power to form District Sub-Committees.

"108. The Agricultural Committees of England shou elect two representatives from each County Council area serve on the English National Agricultural Council, alrea

* Since this paragraph was drafted the Board of Agriculture has b empowered under Sec. 11 (2) of the Corn Production Act to authorize appro bodies to exercise any of the powers of the Board under Part IV. of that with a proviso that the bodies so authorized shall, in the first instance, co of persons who are acting as members of the County War Agricultural Ex tive Committees. This enactment, therefore, provides a natural link betw the Statutory Committees we recommend and those already in existenc

suggested in paragraph 59 of Part I. of this Report.* The President of the Board of Agriculture should nominate to it persons representative of all agricultural interests, so that, however, the total number of nominated members shall not exceed one-third of the Council. The President and the Parliamentary Secretary of the Board of Agriculture should be ex-officio members. The Council so composed should meet at least twice a year to discuss questions of agricultural policy brought before it by the President, or by any of its members on due notice given, and the President or, in his absence, the Parliamentary Secretary should preside over its meetings.

"109. There is already in existence a Welsh Agricultural Council which is not statutory but does useful work. We recommend that this Council should continue to perform the functions of a National Agricultural Council for Wales, and that it should be made a statutory body for the purpose of advising the Board of Agriculture in regard to agricultural matters in Wales, to which the Board may delegate certain powers and functions relating to local administration. The Council should consist as at present of two members elected by each Agricultural Committee in Wales and Monmouth and the agricultural departments of the two Colleges, with not more than twelve members nominated by the President of the Board of Agriculture. The President and the Parliamentary Secretary of the Board of Agriculture should be ex-officio members, and the President or, in his absence, the Parliamentary Secretary should preside over its meetings. All the local work of the Board of Agriculture in Wales should be under the charge of a Principal Officer of the Board, who should be assisted by an adequate staff and have his headquarters and office at a centre in Wales convenient for North and South.

"110. We recommend also that there should be established an Agricultural Committee for England and Wales, composed of the President and Parliamentary Secretary of the Board of Agriculture, eight members elected by the English Agricultural Council, two members elected by the Welsh Agricultural Council, and three members appointed by the President of the Board of Agriculture. The Committee should meet regularly every quarter, and on special occasions when summoned. The President or, in his absence, the Parliamentary Secretary, should preside. It should deal with any business brought before it by the President, but its members should be free to

* See footnote on p. 396.

raise and discuss and pass resolutions on any subject of interest to agriculture or rural life in England or Wales. The proposed annual estimates should be laid before the Committee and discussed by it before being laid on the table of the House of Commons, and when so laid they should be accompanied by a memorandum expressing the opinion of the Committee upon them. All resolutions of the Committee should be laid upon the Table of both Houses of Parliament, if so directed by them.

"111. The National Agricultural Councils for Scotland, England, and Wales, and the Agricultural Committees for Scotland and for Eugland and Wales, should be appointed afresh after every General Election of the County Councils; and the members selected, whether by the County Councils, or by the Presidents of the Boards of Agriculture, or by the National Councils, should hold office until the next General Election of the County Councils.

"*112. If our recommendations are adopted there will be in existence in the United Kingdom four national Agricultural Councils, representing agriculture in Ireland, Scotland, England, and Wales. We suggest that it would be of great advantage to agriculture if delegates from these councils, say, thirty for* England, and five for Wales, and ten each for Scotland and for Ireland, were to meet in conference once a year. The conference should never be held two years running in the same country, but in each country in turn, and the Minister responsible to Parliament for the agriculture of the country in which the conference is held should act as its President for the occasion. An officer of one of the departments of agriculture should be permanent Secretary of the Conference, and responsible for the custody of its records. We believe that the result of such conferences would be to diminish the chances of friction between the three Departments, to encourage the pursuit of a common policy, and to inform public opinion of the special difficulties and needs of agriculture and of its magnitude and importance as an industry. It would be a great encouragement to agriculture if His Majesty the King would graciously consent to become permanent Patron of the Conference of the combined Councils."

Education of Women.—"176. Before quitting the subject we have something special to say about the education of women who can play a great part in the reconstruction of agriculture after the War and whose intellectual interest in country life must be surely aroused if we wish to secure an increased rural

population. We hope that numbers of the women, who have been working on the land during the War, will wish to remain in agricultural occupations and to avail themselves of the openings which will be presented to them in many branches of farming such as dairying in its various forms, pig-breeding, and poultry keeping. We hope that every possible encouragement will be given to women so disposed and that the agricultural colleges will see to it that their courses are made suitable to them, and that the posts of lecturers are as open to fully qualified women as to men.

"177. The subject has already been fully dealt with in the Report (1915) to the Board of Agriculture and Fisheries of the Agricultural Education Conference (Agricultural Education for Women)* presided over by Lord Barnard, which did such a great service in stimulating an interest in agricultural education. We desire to draw attention to this valuable document, to endorse its recommendations (*see* Appendix V.),† and to express our complete concurrence with the following reflection extracted from paragraph 2 of the Report: 'It is between 14 and 16 years of age that so many of the girls brought up in rural districts at present lose touch of country life. No matter what facilities for agricultural education may be offered to them later, these girls will have neither the taste nor the aptitude for it. This is a matter for serious consideration in view of the fact that it is women no less than men who are responsible for rural depopulation, and that there is no inducement in the form of higher wages which will tempt them to return.' The fact is that the local conditions which have brought about rural depopulation, bad housing, low wages, lack of prospects, affect women even more than men, and that the influence of women might be exerted in the opposite direction if they had been taught to make more comfortable homes with less drudgery, and if they had the necessary knowledge to enable them to build up a social order in which the natural advantages of country life could be made to counterbalance the artificial attractions of the town. Lord Barnard's Report deals with the problem of agricultural education as it affects all classes of women, but that of 'The Training and Employment of Educated Women in Horticulture and Agriculture' has also been treated by Mrs. Roland Wilkins in the *Journal of the Board of Agriculture* for October, 1915, and we recommend that article to the study of all those interested in the subject."

* See this *Journal*, December, 1915, p. 859. † Not here printed.

Mr. Jesse Collings' Land Bill.—The Committee after discussing Mr. Jesse Collings' *Land Bill* offer the following observations :—

"241. After this review of the case we will conclude by recommending that the principle of the Purchase of Land Bill should be adopted and an Act passed to give effect to it. We attach special importance to Clause 11 of the Bill, which prohibits sub-division and sub-letting, and we strongly advise that the principle of this Clause should form an integral part of any purchase scheme."

Village Reconstruction, Industries, and Social Life.—"243. The intimate connection between a plentiful supply of agricultural labour and an increase in the output of home-grown food—the primary object of our reference—was recognised in the early stages of our enquiry, and the recommendation with regard to farm wages contained in Part I. of our Report was framed to meet the competition of other and better paid industries. But, in our opinion, the question is not merely one of wages; the conveniences and interests of town life exercise an attraction upon the young rural labourer which can only be met by offering counter attractions in the country districts; and no agricultural policy will be worth having which does not aim at a better developed social life in our villages, at the introduction of fresh industries into the country districts, and at a large increase in the rural population. To this end an effort must be made to break through the stagnation in the life of too many villages by offering better opportunities for social intercourse and amusement, by arousing a stronger feeling of corporate existence and responsibility, and by opening out improved prospects of advancement to the energetic and hard working. With the advance of education a desire for greater opportunities has arisen among the more active and ambitious of the younger generation, causing them to covet the greater scope for their energies offered in urban districts. The proposals made under this head of our Report are designed to lessen the despondency of outlook sometimes associated with existing conditions, and to provide a machinery, which does not at present exist, for the improvement of village life.

"244. The difference between villages, even in the same neighbourhood, is often marked. Some seem to carry outward evidence of the prosperity and happiness of their inhabitants, while the aspect of others, less fortunate, seems to indicate with equal plainness a dull and colourless outlook. In the former are seen smiling gardens, well-cultivated and conveniently situated allotments, cottages in good repair, village playgrounds,

and social clubs and reading rooms; in the latter, with land in abundance around, we find cottages possessing uo gardens or insufficient gardens huddled together so as to reproduce some of the evils of town slums, and absence of all the amenities of life, and allotments so distant from the centre of the village as to be difficult of access and inconvenient for cultivation, the whole presenting an appearance indicative of the conditions prevailing therein. Enquiry will usually show that the difference is due to the fact that in one village a guiding spirit has exercised a sustained policy of development, based upon a clear perception of the requirements of the inhabitants and a study of the best means of providing for them, while the other has been without these advantages. In this connection it has been pointed out that an examination of the maps of the Ordnance Survey reveals how lacking in system has been the development of the ordinary village. In its midst, even adjoining the village street, may be often found land let with large farms, which might better be used for housing or other public purposes, for providing gardens, cow pastures or allotments, or for occupation with adjacent cottages. But it is no one's business to take the lead in demanding a better scheme of use for the land, nor does any machinery exist by which a rearrangement could be carried out. An atmosphere of stagnation prevails, and it is not surprising that the best men in such districts prefer to try their fortune in places offering greater scope for their ambition. The less efficient remain, and the deterioration in the rural working population, of which complaint is often made, becomes an accomplished fact.

"245. Our plan for dealing with these important matters is set forth in detail in Appendix XI. It will be sufficient here to state the general nature of our recommendations.

"We are of opinion that the machinery of the Parish Council, the Agricultural Committee of the County, and the Board of Agriculture should be utilised for the purposes of village reconstruction, and that under proper conditions the necessary land should be acquired by compulsory powers if it cannot be acquired by voluntary agreement. If cottages are built or small holdings are created, we think that the inhabitants of the village should be given the option of tenancy or ownership, but that ownership should not carry with it the power of subdivision or of utilisation for a different purpose than that for which the house was built or the holding created. The money required for a scheme should be advanced out of public funds, and repaid by the Parish Council and the parties benefited,

following the exact analogy of a scheme under the Small Holdings and Allotment Act, 1908.

"246. We have been much impressed with the value of the work done by the Rural League in establishing village industries and of the Agricultural Organisation Society in establishing women's institutes, and we recommend that either the Agricultural Organisation Societies in the three countries or some analogous body should receive distinct grants for these specific purposes and that the task of fostering village industries and of forming women's institutes should be entrusted to them under the supervision and control of the respective Departments of Agriculture."

BRITISH AGRICULTURE AS A BUSINESS PROPOSITION.*

J. H. GUY.

FRANKLY, I am quite sorry that I consented to address a club of specialists on this subject, because I find that all I have learned of the industrial side of farming is of doubtful applicability in England. I am therefore compelled to dwell on your basic conditions as they affect the farming business, rather than on the particular phase with which I am familiar.

I was walking over a large estate with the owner a few weeks ago, and was told that some of the cottages cost £400, and were rented at 3s. per week. The rent was clearly uneconomic, but it was explained that a good man must have a good home, and a good home necessitated a good house, and it was a landlord's duty to supply the same, regardless of economics. Of course, the true meaning was obvious. The labourer received less than his earnings in cash, and the balance was paid in kind. But the results are far-reaching. In effect, the landlord keeps a grip on a part of his labourer's income, and insists on its application to house rent; floating capital, save the landlord's, is driven away from rural cottages; a bad landlord may withhold this portion of the labourer's earnings, and a good landlord can have the luxury of benevolence by giving his labourer no more than his just earnings.

These things may be good or bad, but they give a flavour to the business of farming in England something akin to the fourth dimension. Its existence is indicated, but one never feels quite sure of its reality. If it is real, it should be easy

* Address delivered to the Agricultural Club, 26th June, 1918.

to answer two simple questions—What is the business? and Who is running it? I am quite baffled in getting a definite answer to either question.

What is Farming?—Common sense would indicate that farming is the business of producing, for a profit, certain kinds of food, with such by-products as wool, and hides. But so direct and simple an answer by no means satisfies the many cooks who stir the agricultural broth.

To go no farther than the discussion in this club a few weeks ago, following Mr. Orwin's very interesting address in favour of large farms, there was first a lament because there has been a reduction in the number of agricultural workers which Mr. Orwin's plan would accentuate, and it was assumed as axiomatic that an increased number of workers was in itself a desirable thing. Quite the reverse would be assumed in any other industry. If England could mine her 250,000,000 tons of coal and iron with 500,000 people instead of 700,000 that would be considered a good performance as an economic proposition, as it would leave 200,000 available for additional production in other lines, and increase exportable surplus. Not so in farming. There are many who think that national well-being requires a numerous agricultural population, and this is specifically set forth by the Sub-Committee on Agricultural Policy as a prime objective. There was also introduced into the same discussion the broad social doctrine of the nationalisation of the land, not apparently because it was the best way to make farming pay, but as a sound doctrine in itself. There was also a demand for a highway to social advancement for the agricultural labourer, not observably in the interest of farmers or farming, but again as a social doctrine and an end in itself. And all these were apparently held to be relevant to the discussion of a plan to make farming profitable to the operator.

To an industrial manager like myself, it was like attending a meeting where every speaker used a different language, with Mr. Orwin my only compatriot.

Commerce and Agriculture Compared.—Compare this with a commercial undertaking. There we have a simple direct aim—the profit of the holder of ordinary shares. Every transaction is judged by that one standard. The purchase of materials and the employment of labour must be as cheap as possible. Interest on borrowed money must be low; sales price must be as high as possible; and finally no profits must be paid to anyone else if it can be avoided. To meet this last point the tendency is to reach back through all processes to the raw material, and

forward through all processes to the ultimate consumer. It is true that the word "cheap" must be interpreted in a spirit of enlightened self-interest. The lowest-priced labour is very rarely the cheapest, and the longest hours are not the most productive. But the objective is quite clear—to make profit for the ordinary shares—and it is the creed of many of us that the more intelligently this object is pursued the more easily can it be reconciled with the rising standards of social obligation.

In farming the fundamental objectives are much confused, and for the moment at least the British people seem inclined to conduct agriculture as an insurance against a submarine siege of these islands, as a nursery of manhood, and as a pension scheme for the returning soldier by giving him a strip of land for which he has fought. However desirable these things may be, they are not intrinsically business propositions, though they can be reconciled with business—at a price. If we grant the premise that farming is to be conducted for profit pure and simple, I would concur whole-heartedly in the application of the factory system to the farm, and would accept the conclusion as to farm labour that our choice lies between five labourers at £1 per week and two labourers properly equipped and directed at £3 per week—and rural depopulation be hanged. I shall, however, assume for the purpose of this discussion that any policy to command wide approval in this country, must effect a reconciliation between pure business and certain State requirements.

I find, unfortunately, that this is only the beginning of an answer to the simple question—What is farming? The precise place which is given to the several objectives determines the fundamental character of the industry. The most important of these is the degree to which safe food is to take precedence over cheap food. For several generations cheap food has been absolutely dominant, but under the stress of war there has been a complete reversal to safe food. When the alarums of war have subsided the safe food policy may become a very moderate programme, and it may again be necessary for the land to sell her fair face for the pleasure of the industrial magnate, because her honest housewifery cannot compete with that of younger countries. Arable may again diminish and pasture increase, and you may continue to depend on the incoming ships for daily food.

First Essential of an Agricultural Policy.—The first essential of an agricultural business policy must be for the industry itself

to frame a proposal to submit to the State defining in precise terms what it is prepared to do to meet national requirements, and the price. Consider for a moment the Corn Production Act. To an industrial manager, it would appear that the farmers are treated, and treat themselves, as helpless victims of blind economic forces, and it is the State which is taking the initiative in plans, and the burden of administration. And there is no real evidence that any other method is possible. To what organised body could the Government go for a guarantee that production would in fact be increased in an adequate degree for the money which it was prepared to spend? The result is a minimum price for corn which violates several important business principles, and involves a measure of Government control tolerable only during war.

Contrast this with the case of the Ministry of Munitions securing a forced and uneconomical output in the metal trades. By expert advice the Ministry ascertains a fair price which will produce a certain amount of output under ordinary trade conditions. Still greater quantities are required and the trade undertakes its production at a higher price for the increase, such higher price being based on the increased cost due to using semi-obsolete equipment. Further production is required and new plants are necessary which will be redundant after the War, and a price is fixed accurately measured by the higher depreciation on the war plant. A specific return is guaranteed for a specific payment, such payment being measured accurately by the degree of violation of economy, necessitated by the War demands. Where the industry is not organised, it has had to submit to Government control, with a loss to both sides due to divided interests and responsibility. If this one point could be brought home to the farming community, and they realised fully the annoyances of control, it should prove a very strong inducement to organise politically and industrially. The State, I am sure, would greatly prefer to deal with such an organisation rather than assume control. I have seen no evidence of the desire on the part of the much abused civil servant and so called bureaucrat to reach out into new fields except with great reluctance. On the other hand, the somewhat proud statement of the writers of the Agricultural Policy Report that the ownership of land is vested only in the landlords, and that in dealing with them the State knows exactly where it is and whom to hold responsible, is not altogether borne out by the situation revealed when definite action has to be taken

There can be no satisfactory reorganisation plan which leaves *the most important* measures to be settled in the political arena. It is, therefore the first duty of the industry to present a reasonable proposition to the State, and to undertake to return a guaranteed minimum of production for a stated price. As to the price it is easy to state the basis. It must represent the ascertained offset to the unequal conditions of cheap land and virgin soil, as on the American continent, and sweated labour, as in Russia, less the cost of transport. It must not be a mere protection of inefficiency. This is vaguely recognised, but there is no sufficient assurance to the taxpayer that he is not being charged for incompetence, and it is bound to lead to a reopening of questions which would vitally affect any business policy.

Take a parallel with commerce. To increase sales, extra commissions and prizes are often given; but if sales were £1,000,000 per annum and the bonus offered were a flat 5 per cent. on all sales, no board of directors would face the risk of £50,000 dead loss before one extra sale was secured. If £100,000 increase of sales were secured an instant calculation would be made by every member of the board that the extra £100,000 of sales had cost £55,000 in additional sales expense. This course is, nevertheless, the one chosen by the Government, and this obvious criticism will be very generally made when peace returns. Some recognition must be made of the ability of certain lands to compete with little or no subsidy, and margin created for a high subsidy on less fertile lands. It is also essential that the Government assistance be asked for only so long as, and to the degree that, the unequal conditions exist.

Effective Management of the Agricultural Industry.—As to a guaranteed minimum production in return for the subsidy, there is at present no one to give and enforce the guarantee because there is no effective general management of the industry, and the obvious remedy is to create one. Unless the farming community is prepared to appoint a body from its own numbers, independent of the State, to make such a proposition, and to guarantee a valuable return to the State, there is only the alternative of State control to secure increased production.

Farming and Population.—There is also another unsettled point of primary importance in arriving at what farming is. That is the ideal, variously referred to as the reservoir or nursery of manhood, the back-to-the-land movement, or in its more prosaic form, a large home market for manufactures;

and finally, in its negative form, as rural depopulation. A reservoir of healthy and contented men and women is the phrase used by the Agricultural Policy Sub-Committee, and a more nebulous phrase on which to build a business policy one can hardly conceive It leaves entirely in doubt whether we are to plan for large units, each equipped with a rounded organisation of accountant, purchasing agent, sales manager and the like ; or whether we are to plan for auxiliary common services for small units. On the basis of pure economics and open competition the larger unit must win, but if the creation of a large body of well-rounded business men is the ideal then again the industry must approach the State, name a price, justify its basis and guarantee a result. I am inclined to think that English sentiment tends towards the small unit with common services, and that any specific measures of business policy must be adapted to that end. But you will observe that the only answer I have been able to secure to my opening question "What is Farming ?" has been one assumption on top of another.

Who is Running the Industry?—The other question—"Who is Running the Industry ?"—brings equally indefinite results. The landlords apparently claim to do so ; but, when the matter is put to the test, the State has to take charge in default of any responsible body, and so we have the Food Production Department, the Agricultural Organisation Society, and other public or quasi-public bodies taking the place of an association of the industry.

It is reasonably evident to me that there are no definite answers to the two questions I have put, and that the fundamental character of the industry is still to be bandied about as an incident of fiscal and political controversies, with precedence to the noisiest.

Three Basic Conditions for Success.—The reorganisation of farming, like every other reorganisation, must absolutely settle three basic conditions to secure success :—

1. A management vested with authority commensurate with responsibility.
2. A dominant objective to give unity to the industry.
3. A policy of management which reconciles the parties at interest, and gives reasonable assurance of a profit to the operators.

All three are singularly lacking in the present conduct of English agriculture, and no provision has yet been made for their establishment. In the prosperous days of English farming all three were present. If I read English history

imposition. At 5 per cent. on this capital the change would be 25 per cent. on the increase I have assumed. The threat of this imposition strikes at the foundation of any organisation of farmers as business men. It appears to me that there are two, and only two, ways of securing a businesslike solution. The first is for the landlords to operate the farms direct, and the other is for the farmers to buy out the landlords. Both solutions imply a scrapping of the elaborate paraphernalia of Land Courts, allowances to outgoing tenants, and erudite discussion about the three F's. The remedy is a Land Purchase Act giving the cultivator of the soil facilities and the right to purchase. The essential to business policy is that management and ownership shall run together. Imagine Swan & Edgar's at the corner of Piccadilly Circus exposing themselves to a revision of rent based on their earnings every seven years. No staple industry in the world except agriculture has been attempted on such a basis. It may be urged that landlords are considerate and neighbourly and do not take their pound of flesh. Such an intolerable position would have been ended long ago if they had. But in America we have decided that the potential ability to injure is almost as vicious as actual injury, and our anti-trust laws have been interpreted accordingly. It is intolerable to manhood that the upbuilding of years shall periodically be placed in another man's hands "to touch and remit after the use of kings." Ten thousand kings would upset any business. The English genius for compromise has made it work passably well at times, but it is my opinion that those times have passed. If farmers are to develop their scattered units into an organised industry, the threat of this undefined mortgage on their labours must be removed. If landlords are to organise the bnsiness, it is essential that they should reap their reward in the form of increased rental or return on capital, and their profit and loss account would then be as in Table III. It will be observed that in Table II. the farmer theoretically gets double the return that he would in Table III., and in practice this would, I think, be substantially true in time.

Future of Labour.—This matter is also of overwhelming importance to labour. The economic future of labour depends on the application of scientific management on the farm, standardised conditions, standardised operations, despatching, standards of performance, and an efficiency-reward.

An interesting pamphlet by Mr. T. B. Ponsonby is the only farm literature I have seen on the subject, but the matter has

received much study in commerce and we have learnt by our mistakes. Mr. Ponsonby barely mentions standardised conditions, but this is the root of the matter. If piece-work, bonus schemes, stints, differential rates, or any other form of efficiency-reward, is based on existing conditions, any improvement that involves capital or effort on the part of the farmer must be paid for by a reduction in bonus rate, though not in weekly total, and then the trouble begins. How can equipment be standardised under the English system of land tenure? I have seen farms where a very large part of all labour was obviously wasted by the bad arrangement of buildings and equipment, and a considerable expense would be necessary to cure it, but I doubt whether a new tenant who never made time-studies of each operation would pay 1*d*. extra in rent. My wife informs me that each meal prepared in our house in England takes 3½ times the running about that it did in our American home, 300 ft. against 80 for afternoon tea for example, and she has properly scaled charts which have passed expert criticism, to prove her point. But there is no cure. Our temporary residence here would not justify pulling about scullery, pantry and kitchen, and the landlord would not find one person in ten who would pay for the rearrangement until after a period of occupancy. I examined last year time-studies in painting shell. In 25 establishments the labour hours per thousand shell varied as 5 to 1. The worst took five times as long as the best. The cure lay first in the arrangement of benches and machines, smoothing of floors and minor changes of that character, and second in instruction. There was little visible improvement in the physical equipment, but there was doubled efficiency shown in the reduction of cost and increased earnings to the workers. In the last year I have seen dozens of startling improvements of this character, most of which would have been stultified under a tenancy system.

The farm labourer lies under a burden of unintelligent and unnecessary chores (jobs), rendered inevitable by this extraordinary system of separating management from ownership.

Cost Accounting.—The farm labourer has much in common with the famous tramp who was willing to work for his breakfast, but went without rather than pile the firewood on the other side of the yard for no earthly benefit. Useless work strikes at the soul. Every hour of every day that is happening on most of the farms of England. And that leads naturally to the subject of cost account. It may comfort you to know that only 10 per cent. of American industry has any cost accounts.

Competent opinion added to my own unrivalled facilities for information on this matter leads me to believe that in England there is less than 5 per cent. In Germany it is 90 per cent. The paramount importance of cost accounts for the improvement of farming as a business, combined with the fact that it is one of few subjects not fogged by unsettled basic conditions, make the matter one of present practical interest. The trouble in the way of general application is the unfortunate fact that farm cost accounts present great technical difficulties. As a practical accountant, I do not believe that farmers will ever master the subject, and probably would not be justified in giving the time necessary to do so. Any accounts they are likely to keep would fail to reveal so many factors, that the accounts would mislead as often as they would correct his judgment.

My only hope lies in the recent development of machinery which renders possible centralised accounting from simple basis returns like time-cards, milk-weights and feed-tickets. This is not the time and place to discuss the technique, but I expect to see its use in England despite the difficulty of cumbersome weights and measures. The real trouble will be to induce farmers to make any returns, but that will probably be less difficult than to educate them in the intricacies of cost accounts. The choice is between a course that is pyschologically difficult and one which seems to me intrinsically impossible.

Financial Side of Farming.—The commercial side of farming, that is the buying and selling of requirements and output, is of immediate practical importance, but here, again, a satisfactory solution is impossible, until we have a more definite answer to my question—"Who is running the business?" I will, however, present a few thoughts applicable to the problem whether the answer is landlord or farmer.

If we turn back to my first table, the output in 1907 is shown as 127 millions, and the value of the farms in England and Wales was apparently £700,000,000, and farmers' capital has been estimated at 40 per cent. that of the landlords. But placing the two together at £700,000,000 the relation of capital to gross output is over 500 per cent. The relation to net output, that is gross output less purchases, is nearly 800 per cent. against 115 per cent. as the average of English industry, exclusive of agriculture. In a typical trade connected with farming, that of the feed and fertiliser merchants, the merchants state that the relation is about 12½ per cent., which means

they turn over their capital eight times a year and the farm once in eight years. The high relation of capital to turnover is the first important fact on the financial side of farming. The second is that the farmer stands between the upper and nether millstones of commerce, in a peculiar degree. We all have the upper eternally rubbing us, but it does not grind because we can generally pass the price on to the customer. But the farmer has no distributing machinery and he cannot do this. I must again appeal to a table to illustrate the point (Table IV.)

That is, a purchase starts from the factory at 53 and gets on to the farm at 105, and a sale starts off the farm at 1*s.* 2¾*d.*, and gets to the consumer at 2*s.* 2¾*d.* The farmer pays double costs and receives half the sales prices. Of course, there are legitimate expenses in between, but the facts contain a moral and constitute the second important point. The third I draw from another of my dull tables—the manufacturing activities of the Industrial Co-operative Movement (Table V.). From this it will be seen that over two-thirds of the total is composed of dressing the farmer's product. The summary of the three points is this :—

The farming industry requires to turn over its capital more frequently, to control its purchasing and distributing machinery so that it can pass on its fair and reasonable costs to the consumer, and to cease paying profits to every unwelcome interloper who can manage to intrude between the factory and the farm, and between the farm and the consumer. This can only be done by capital combined with expert management, and I am round to my starting point "where is the management ?"

Lest it be said that I give only destructive criticism, I furnish a table (Table VI.) which contains the idea of a real business of farming. The figures can be filled in when my original simple questions are answered. The first column should contain the gross return from farming as paid by the consumer ; the second, retailing costs only, no profits to middlemen ; the third, the costs of bacon factories, slaughter-houses and wholesaling operations ; the fourth, the cost of imported wheat and meat, by which I imply that the way to control foreign competition is to take a profit on its milling and slaughtering ; and the last column is to contain the value of home farm products based on an intelligent understanding of costs.

If you will study the departments of Food Production and Food Control and the A. W. S., I am inclined to think there is a fighting chance for farmers to control their own business.

In conclusion, I commend to the attention of farmers that simple instrument, the funnel. The wide end should be at our pockets when we receive, the narrow end when we pay—not the reverse as at present.

APPENDIX.

Some of the figures in the tables below are very rough approximations, and are used in the text merely to show tendencies, as in the case of rent, which in Table I. is shown as £22,000,000 and 17·3 per cent. of the sales. In Table II. it is shown at the same figure in money, but is only 8·6 per cent. of the estimated increased sales. This is to indicate the manner in which the farmers would gain through increased volume, if the rent could be fixed.

No conclusion is drawn in the text except from official figures.

TABLE II.—FARMER ORGANISING.

Expenses.	*Millions.*	*Per cent. of Sales.*	*Sales.*	*Millions.*
	£			£
Labour	60	23·5	Crops	105
Feed and fertilizers	48	18·8	Animals	95
Rent	22	8·6	Dairy produce	36
Cattle for feeding	12	4·7	Fruit, etc.	5
Implements	6	2·3	Poultry	12
	148	57·9		
Farmer	107	42·1	Wool	2
	£255	100		£255

£251 per farmer.
£190 per farmer on assumption of 10 per cent. of sales for miscellaneous expenses and interest on capital.
Previous figures arbitrarily increased as to sales for an assumed increase —see text.

TABLE III.—LANDLORD'S ORGANISING.

	Millions.	*Per cent. of Sales.*
	£	
Labour	60	23·5
Feed and fertilizer	48	18·8
Cattle for feeding	12	4·7
Implements	6	2·3
*Farmer	43	16·7
	169	66·0
Landlord for return on capital and organization expenses	86	34·0
	255	100

* £100 per farmer.
Table with the same assumed increase as in Table II., arranged to show what landlords might expect if they organized the industry.

TABLE I.—ESTIMATED FARM PROFIT AND LOSS ACCOUNT (ENGLAND AND WALES): 1907 FIGURES.

Outgoings.	£	*Per cent. of Sales.*	*Receipts.*	£	*Per cent. of Sales.*
.bour	30,000,000	23·5	Farm crops sold off Farm	40,200,000	31·5
ed and fertilisers	24,000,000	18·8	Animals	50,800,000	39·8
nt	22,000,000	17·3	Dairy produce	25,500,000	20·0
ported cattle for feeding	6,000,000	4·7	Fruit, flowers, and timber	4,700,000	3·7
plements	3,000,000	2·3	*Poultry*	4,350,000	3·4
			Wool	2,100,000	1·6
	85,000,000	66·6			
lance for miscellaneous expenses for interest on farmer's capital and for farmer's labour	42,650,000	33·4			
	£127,650,000	100		£127,650,000	100

thorities—

For Sales of £127,650,000 receipts .. .. Cd. 6277, page 25.

Labour £30,000,000 .. .. Private returns covering about a dozen farms. The figure is not adequately proved as there is obviously great variation. The figure used, however, checks clearly with the persons engaged in agriculture at the known wage rates.

Feeds and fertilisers .. .. Cd. 6277, pages 26 and 28—30, checked also with Board of Trade Returns.

Imported cattle .. .. Cd. 6277.

Implements .. .. Various official figures and personal knowledge of the trade.

TABLE IV.—PURCHASE OF IMPLEMENTS.

	Per cent.
Manufacturing cost ..	53
Selling expenses	22
Collection expenses ..	5
Bad debts	3
Administration	2
Profit	15
Manufacturer's price ..	100
Local agent's commission ..	5

SALE OF MILK.

	Per Gal. s.	d.
Farm price	1	2¾
Carriage to wholesaler ..		1¼
Wholesale cost		1⅛
,, profit ..		⅛
Carriage to retailer ..		1¼
Retailer's costs		6
Profit		1⅛
	2	2¾

American figures. The author is his own authority, with ample opportunity for knowledge.
These figures are on excellent authority, but the author does not feel at liberty to quote the source.

TABLE V.—PURCHASES AND SALES.

£	
6,083,163	Bread-making and confectionery.
5,980,265	Corn and corn milling.
5,258,399	Slaughtering and other foods.
3,942,095	Textile clothing manufacturers.
2,291,570	Other manufacturing processes.
778,335	Quarrying and constructional work.
467,967	Agricultural departments.
24,801,794	

Published reports of industrial co-operation societies, 1912.

TABLE VI.—FARM OUTPUT AS A BUSINESS.

Commodity.	Retail Price.	Cost of Farmers' Retail Society.	Cost of Farmers' Wholesale and Manufacturing Society.	Cost of Imported Purchases.	Farm Price and Profits on Imports.
Crops ..					
Animals ..					
Dairy produce					
Fruit, flowers, and timber					
Poultry ..					
Wool ..					
Total ..					

WAR-TIME FARMING PROBLEMS.

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Executive Officer to the East Suffolk War Agricultural Executive Committee.

IN view of the great importance of increased production in agriculture, and of the effort now general throughout the country to raise the standard of farming, a short outline of some of the problems arising in what is perhaps a fairly typical agricultural district should be of interest to readers of this *Journal.*

In East Suffolk the acreage of arable land, permanent grass and rough grazings in 1916 was as follows :—

Arable land	326,345 acres.
Permanent grass	129,176 ,,
Heath land used for grazing	12,924 ,,

Statistics of the acreage of woodland were not collected in 1916, but in 1913 the acreage of coppice, plantations and other woods was 18,543 acres.

The proportion of arable to grass land is very high. Quite a considerable proportion of the permanent grass consists of low-lying meadows, so that the proportion of upland grass is very small. The heath land consists of poor, light sand—in most cases too poor to be worth cultivating, but generally capable of growing forest trees.

Before the various problems met with are discussed it will be useful to describe briefly the soils of the county, in order that the reader may have some idea of the agricultural conditions prevailing.

Heavy Soils.—The heavy soils of East Suffolk are formed by the weathering of the geological formation known as " Chalky Boulder Clay," which covers about 60 per cent. of the total area of the county. In the East Suffolk area all the soil on this formation can be ploughed with two good horses attached to a single-furrow plough, so that, although heavy, it is by no means so difficult to work as are some of the sticky clays of the Midlands, which require three or four horses to plough.

The soil is very retentive of water, and nearly always requires under-drainage before satisfactory results can be obtained from arable land. A large number of chalk stones are present in the Boulder Clay. This usually renders the application of lime to these soils unnecessary.

Nearly all the soils in this formation in East Suffolk are extremely responsive to basic slag, which forms an excellent means of improving poor grass land, and also gives good results on arable land, particularly for clover and beans.

The East Suffolk Boulder Clay works down to a heavy soil which is often poor, but when well farmed over a period of years is capable of yielding good crops of wheat, beans, and clover, and fair crops of barley and oats.

Light Soils.—In East Suffolk light soils occur chiefly on the geological formations known as "Glacial Sand and Gravel" and the "Norwich and Red Crag." The latter covers about 8 per cent. of the whole area of the county, whilst the former covers about 25 per cent., so that about one-third of the county is light land. The light soils vary in type from useful light loams to worthless blow-away sands. The better type of light loams, although often somewhat deficient in lime, give good yields of most farm crops. In the writer's opinion potatoes might be grown much more extensively than is the case on these soils, whilst sugar beet is also a most promising crop.

Mixed Soils are formed when the varying formations lie in proximity to one another. They are usually very useful from an agricultural point of view, and will grow almost any crop.

Alluvial Soils account for about 5 per cent. of the total area. They are almost all "marshes," *i.e.*, low-lying land on the banks of rivers or near the sea. They often make good grass land but are usually unsuited for tillage. Many of them might be much improved by an efficient system of drainage. In some cases, where the water is pumped up from the marshes artificially, the grazing lets annually at very high figures.

Having now shortly described the soils of the county we may proceed to investigate the special problems which the work of the War Agricultural Executive and District Committees has revealed.

Up to May, 1918, in the course of 15 months' work, the Executive Committee have dealt with problems arising on 468 farms.* This figure is entirely exclusive of the question of breaking up grass land, and of a large number of cases which have been dealt with by District Committees without reference to the Executive Committee.

Bad Farming.—Chief amongst the problems arising are those due to bad farming, *i.e.*, neglect to keep the land clean and to maintain its fertility. This may be due to the individuality of the occupier, to lack of labour or capital, or to a variety of other reasons. Bad farming was responsible for the trouble in about 75 per cent. of the cases which arose.

In most cases the occupiers were warned, while in many cases they were interviewed by the Executive Committee or by the District Committee, or by both. Good results have usually followed such action. Frequently occupiers were asked to act under the "supervision" of a good local farmer. In many

* This information and that which follows, relating to the work of the War Agricultural Committee, is rendered available by the courtesy of C. C. Smith, Esq., J.P., Walton Hall, Felixstowe, Chairman of the War Agricultural Executive Committee for East Suffolk.

cases this has proved a most successful arrangement, and the farmer in question has greatly improved his methods, to the benefit of both the country and himself. Although there have been exceptions, it has been found that as a general rule inferior farmers have been quite willing to take the tactfully-offered advice of a good local farmer.

In a limited number of cases it was found impossible to pursue the course described, and the tenancy of the occupier was terminated by the Board of Agriculture, at the request of the Executive Committee.

In other cases the course described was, for various reasons, impracticable, and the Executive Committee found it necessary to take possession of the farms and themselves farm them. In such cases it has usually been found possible to get good local farmers to manage the farms on behalf of the Committee.

Farms Managed by the County Agricultural Executive Committee.—The total number of farms of which it has been found necessary to take possession in this way up to the present has been 16 (including a few small areas) the area involved being 1,977 acres. A short description of a few of these cases may be of interest to readers of this *Journal*, as showing the kind of problems which arose and the methods of dealing with them.*

A.—A farm of 150 acres of average, heavy land, had been allowed by the owner to seed itself down to natural grass within the past 5 years. The rough feed resulting consisted principally of water grass (*Agrostis*). Most of the farm had been arable until 3 or 4 years ago, but this was all unploughed when the Committee took possession. There was an enormous number of docks on the fields allowed to go down to grass recently, the docks having been allowed to seed freely for 2 or more years. An auction was held annually and the rough feed was let for grazing purposes. No one lived at the house, as the owner (who was also the occupier) lived at another farm. The Executive Committee took possession of this farm in the summer of 1917. A local farmer undertook to manage it on their behalf. The "rough feed" was steam cultivated and fallowed. The cropping for the harvest of 1918 will be 26 acres of wheat, 9 acres oats, 7 acres peas, 12 acres beans, 16 acres barley, 3 acres oats and tares. There are also 21 acres for roots and fallows. All the crops were dressed with suitable artificial manures. There was no farmyard manure available,

* The writer is indebted to Messrs. D. Black, J.P., and J. R. Grimsey, O.B.E., J.P., for particulars regarding two of these farms. The gentlemen mentioned are [illegible] of the Com[illegible]

no stock having been kept owing to the absence of food for them. At the time of writing (May 1918) all the crops look well.

B.—Another farm of about 350 acres of useful heavy land came under observation. It was owned and occupied by a gentleman who had a business in an adjacent town and who did not properly understand farming. He had in past years erected unnecessarily elaborate farm buildings, with the result that the farm had cost him much more than it was worth. Since 1915, finding himself very short of labour he left part of the farm severely alone, the stubbles being unploughed. The Committee took possession in June, 1917, and steam cultivated and fallowed a large area of the neglected land. In the autumn, the owner decided to let the land, and having found a tenant who met with the approval of the Committee, he did so, the Committee retiring from possession. It is worthy of note that in providing labour for this farm the Committee were greatly helped by the policemen-ploughmen sent out by the Food Production Department.

C.—In another case a farm of about 500 acres, partly light and partly a heavy loam, had been farmed "off hand," *i.e.*, by a farmer who lived elsewhere. It had been let at a low rent, and the premises had been allowed to get into a very bad condition, both owner and occupier having adopted the principle of "spend as little as possible." The farm is naturally quite useful land, but was in a very poor state. The tenant gave up possession at Michaelmas, 1917, and the landlord was apparently unable to let it owing to its generally neglected state, the house, a very fine one, being uninhabitable. The owner took no steps whatever to cultivate the farm. The Committee took possession, and with the aid of motor tractors and soldier labour have succeeded in getting it into cultivation.

There have been sown for the 1918 harvest 77 acres of oats, 21 acres of peas, 30 acres rye, 64 acres barley, 3 acres vetches, 30 acres lupins, and 30 acres of roots. Seventy acres, which are in a very foul condition, including one field which has been untouched for several years, are being fallowed. The Committee did not enter into possession early enough to get any wheat sown.

All the above crops have been dressed with suitable mixtures of artificial manures. At the suggestion of the writer a strip in most of the fields was left undressed. These strips afford

a

If the Committee had not taken possession of the farm it is probable that no corn whatever would have been grown for the 1918 harvest.

D.—Another farm of good heavy land, about 150 acres, was taken possession of by the Committee. It had been farmed by the owner, who lived some distance away. To illustrate the state of the farm it may be mentioned that the Committee found it necessary to burn the second year "clover" crop, as it consisted chiefly of weeds, the seed of which would have germinated if the crop had not been burnt. The Committee entered into possession in the summer of 1917, and have now 48 acres of wheat, 17 acres barley, 4 acres oats, 7 acres peas and 6 acres beans on the farm. The wheat when inspected late in May looked so well that there was a fear that it might lodge before harvest.

PROBLEMS DUE TO NATURAL CONDITIONS OF THE LAND.—We may now consider the various problems which arise owing to natural conditions of the land, such as wetness or poverty.

Draining.—The problems associated with drainage may be divided into two classes: (*a*) those connected with main watercourses; (*b*) those connected with the actual drainage of individual fields, either by pipe-drains or otherwise. The latter class is generally only concerned with the heavier types of land. It was found that in East Suffolk the main watercourses were in a very neglected state. The course of the water in most streams was more or less impeded by the growth of bushes, trees, etc. Owing to lack of a central authority dealing with the whole stream in question concerted action in the past has been impossible. A man will not cleanse his portion of a stream unless his neighbours further down will do theirs. The result of this is that land near the stream is flooded, and the outfalls of drains and ditches are blocked up owing to water being held back. In view of the great scarcity of labour it is impossible at the present time to deal with all the streams in the county. With the help of German prisoners, however, and in conjunction with the Norfolk War Agricultural Committee, a commencement has been made in cleansing the River Waveney, which acts as a boundary between the two counties.

In the 10 years before the War, a good deal of pipe-draining was done in East Suffolk, and a little has been done since the outbreak of War, but the cost of the operation has become so high as to cause hesitation on the part of farmers before under-

draining gives very good results on many heavy soils in East Suffolk, and has been and is being extensively carried out. In general it may be said that unless under-drained in some way or another, East Suffolk heavy soils give very inferior results. When well drained, generously manured, and kept clean, most of them may be relied upon to produce very useful crops of corn and roots.

Poverty of the Heavy Land.—Probably half the Boulder Clay area in East Suffolk may be accurately described as poor, heavy soil, the remainder being good corn-growing land of a heavy type.

A considerable area of the poorer heavy land was allowed to go down to grass during the period of agricultural depression. In many cases no grass seeds were sown, but the land was allowed to seed itself down naturally. One of the first grasses to appear in land of this type when left to nature is "Water Grass" (*Agrostis*), and to-day many thousands of acres of land are in "grass" which consists largely or partly of *Agrostis*. As a general rule better grasses and white clover gradually make their appearance after some years. When neglected for a number of years, being merely "rough grazed," thorn bushes often appear, and from information available it appears that in the spring of 1918 there were no fewer than 1,500 acres of heavy land covered with thorns or brambles, most of the poor, heavy-land parishes contributing to this total. Sometimes quite useful heavy land will grow bushes and brambles in this way if neglected over a period of years.

It is suggested that if the poor, heavy land referred to had been frequently slagged, the bushes removed as they appeared, and the ditches kept cleaned out, this trouble would not have arisen in its present acute form. It is almost certain that the expenditure involved in these operations would have been very profitable to the owners and occupiers.

Use of Basic Slag.—A small area of grass land of this type, taken in hand by the East Suffolk County Education Committee in 1901 and slagged 3 times in a period of 10 years, gave an average yield of 28 cwt. of hay per acre per annum, whilst an adjoining piece receiving no manure gave an average of 9 cwt. At current prices this resulted in a total profit to the occupier of £23 12*s*. 6*d*. per acre over the period.

The experimental field is very similar in character to a large area in East Suffolk, and there can be no doubt that had the whole of such land in the county been slagged 3 times during the 10 years preceding the War, its productive capacity would

have been enormously increased. It would also have accumulated a considerable store of fertility from the air by means of the nodules on the roots of the white clover, the growth of which is encouraged in such a remarkable manner by the application of slag. If slag had been applied to all this land there can be no doubt that much of it would have been more worth ploughing up at the present time. As matters are, it is unfortunately true that where slag has not been applied, much of this land is really too poor to plough up with a reasonable prospect of a crop, so that the limited amount of labour available is better spent on land which will give a better return.

If all the basic slag produced in Great Britain before the War had been used at home, large areas of our poor heavy-land pastures would be in a much better condition than they are to-day, and our national food supplies would have been correspondingly more secure.

Very large quantities of slag have been used, however. The writer was not concerned in any way with the establishment of the Experimental Station at Saxmundham, as he did not come to the county till 1911, so that he can fittingly pay a tribute to the great good done to agricultural production in the district by those who were instrumental in establishing that station. Not the least of the benefits conferred upon local agriculture has been the demonstration of the value of basic slag upon Suffolk poor heavy clay soils. It is probable that Saxmundham reflects the requirements of most poor clays in the Eastern Counties.*

Ensilage.—If, in the future, the food requirements of the nation necessitate the breaking up of large areas of these poor, thin-skinned heavy soils, great skill will be required if adequate returns are to be obtained from them. There can be no doubt, however, that even the poorer clays, in many cases now growing only rubbishy grass, could be made much more productive if well drained, manured and farmed. The writer still holds the opinion expressed elsewhere,† that the introduction of ensilage would increase the productivity of this class of poor clay soil. Oats and tares usually grow well on it, as does lucerne also. These crops make excellent silage and produce a much greater weight of green fodder per acre than the poor grass of which we see so much. Lucerne seems especially

* See Guide to the Experiments at Bramford and Saxmundham, 1906, T. H. Middleton, M.A.

† "Modern Ensilage Practice," A. W. Oldershaw: *Transactions of the Highland and Agricultural Society of Scotland*, 1917.

suitable as a means of keeping such soils in cultivation. There is little expense on it, it is very productive, and when ploughed up two or three good crops are almost sure to follow owing to the nitrogen it has accumulated from the air—provided one is fortunate enough to escape the depredations of the wireworm. *Oats and tares* also are a most productive crop even on poor, heavy land. It has been found that 14 tons of green oats and tares can easily be grown on good land* and on poor, heavy soil at Saxmundham, 11 tons 15 cwt. per acre of green tares alone have been weighed. On the same soil the average weight of a "no-manure" plot on old pasture for four years ending 1917 was only 1 ton 16½ cwt. of green grass per acre, whilst a similar plot manured with 10 cwt. of high-quality slag per acre yielded 3 tons 15½ cwt. green grass per acre.† This latter figure, although showing a great increase as a result of the application of the slag, compares very unfavourably with the tares in respect of green matter per acre.

The general question of poverty of the soil has also arisen in an acute form on large areas of heavy land still under the plough. This land has been arable for a long time and is thoroughly farmed out. There appears to be no cheaper way of enriching it than growing lucerne. Unfortunately, however, the growing of that crop, like the application of basic slag to poor grass land, takes years before its full effect is seen upon the soil. Yet the fact remains that most, if not all, Suffolk heavy clays will grow lucerne well if thoroughly drained. The growing of lucerne, like the application of slag, is an economic proposition—it will "pay" the man who does it, and probably "pay" him well. At the county experiment station at Saxmundham, on a poor Boulder Clay, an average weight of 3 tons 8 cwt. of lucerne hay per acre was obtained over a period of 6 years (1903–1908) from a plot which received an annual dressing of 2 cwt. of superphosphate and 1 cwt. of muriate of potash per acre. An adjacent plot receiving no manure gave an average yield of 25 cwt. of lucerne hay per acre. In a field near to this, some further plots were started in 1911 and mown every year for 5 years. Here the "no-manure" plot gave an average of 2 tons 13 cwt. of lucerne hay per acre per annum, whilst a plot receiving 2 cwt. of superphosphate annually gave 3 tons of lucerne hay per acre per annum. In the field in which the first experiment was

* This *Journal*, July, 1906: "Cost of Production of Silage," A. Amos, and A. W. Oldershaw.

† This *Journal*, November, 1917: "Yields of Grass from various Basic Slags," A. W. Oldershaw.

conducted are some grass plots which have been manured in various ways. One of these received a dressing of 7 cwt. of superphosphate and 3½ cwt. of kainit in 1901, 1904, 1907 and 1912. The average weight of hay on this plot for 11 years was 27 cwt. per acre. A " no-manure " plot gave an average yield of 9½ cwt. per acre. From these figures it appears probable that as a general rule, on this type of soil and with similar manurial treatment, lucerne will give more than twice as much fodder per acre as will grass. It is probably also more independent of manure.

It is evident that the general problem of the poverty of the soil is a very formidable one. On heavy land it seems useless to attempt to solve it until the land is efficiently drained. Once that is done much may be hoped for by the growth of nitrogen-accumulating plants such as lucerne and tares, in addition to those commonly grown, such as beans, peas and clover. By encouraging the growth of all leguminous plants, and so enriching the soil in both nitrogen and phosphates, basic slag and superphosphate are of the utmost value on such soils. Both manures may be used on either arable or grass land, and may be expected to repay their cost many times over.

The introduction of ensilage seems very promising. By producing a larger bulk of green stuff at home and so making the manure heaps bigger, more of the farmyard manure which these heavy soils so badly need will be rendered available, and the stock-carrying capacity of the farms will be increased. In this connection reference may be made to the scheme of the Food Production Department,* whereby assistance is given to farmers and landowners in the erection of concrete or brick silos.

The process of the improvement of poor, heavy land is a slow one, but it is also sure, and there can be very little doubt that fair returns can be hoped for if generous manuring is associated with skilful husbandry.

Poverty of the Light Land.—As has been previously noted, about one-third of the total area of the county consists of light land. Probably about half of this is useful soil capable of growing good crops if generously manured.

Use of Phosphates.—Some of this light land is exceptional in containing ample supplies of available phosphates. Thus, at the experimental station at Bramford, near Ipswich, conducted by the East Suffolk Education Committee for some years, it was found that soluble phosphates in superphosphate gave practically no results and in some cases did actual harm. This

failure of superphosphate has been shown by Professor T. B, Wood* to be due to an exceptionally high percentage of available phosphate in the soil at Bramford.

In his report on Experiments at Bramford, 1906, Mr. (now Sir) T. H. Middleton† points out that as superphosphate is an acid manure it is quite possible that its use year after year on such soil may be injurious. The experience of farmers on other light soils near Ispwich indicates that superphosphate occasionally gives disappointing results. It is worthy of note that coprolites or phosphatic nodules occur in deposits in these districts, but whether the presence of these deposits is in any way associated with the high percentage of phosphates in certain soils is not known to the writer.

The extent to which neutral or basic phosphatic manures, such as steamed bone flour and basic superphosphate, are likely to give results on light soils having an average phosphate content is uncertain. The writer has evidence which leads him to think that on some of the light soils in this county the inclusion of neutral or basic phosphates in the manure for such a crop as potatoes is desirable.

Thus in an experiment with potatoes on a light soil near Hoxne in 1915, 1 cwt. of sulphate of ammonia, 4 cwt. of superphosphate and 1 cwt. of muriate of potash gave 10 tons 12 cwt. of potatoes per acre, whilst the substitution in this manure of basic superphosphate for the acid superphosphate gave 11 tons 2 cwt. of potatoes—an increased yield of 10 cwt. per acre.

The question, however, is one which requires further careful investigation, but from knowledge available up to the present, the light land farmer in Suffolk may more safely use a neutral or basic, rather than an acid phosphate.

Potash and nitrate of soda gave remarkably good results at Bramford Experimental Station when applied to suitable crops. Thus, 1 cwt. of muriate of potash applied annually to lucerne increased the average annual yield of lucerne hay over a period of 6 years (12 cuttings) from 45 cwt. to 61 cwt. per acre.

Most of the better light soil of East Suffolk is probably well suited for potatoes, although that crop has not been very much grown in the past. Sugar beet also promises to be a most useful crop.

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* See paper by Professor T. B. Wood in the *Transactions of the Chemical Society*. 1896, p. 287.

† Guide to the Experiments carried out at Bramford and Saxmundham by the East Suffolk Education Committee in 1906, by T. H. Middleton, M.A.

Probably one-sixth of the total area of the county may be described as poor, light soil, and of this a considerable area is only just on the margin of cultivation or is actually derelict. These poor, light soils are not suited for corn growing, with the exception of rye and lupins. In dry seasons, which occur very frequently, the barley may fail to come out into ear, and so produce nothing. The soils are more suited for growing green crops for sheep, and on the better soils for growing potatoes and sugar beet.

Folding Sheep.—Large flocks of sheep are kept by many of the light land farmers, and are folded on the arable land. There can be no doubt that this is one of the best ways of managing this class of land. The manure is produced on the land where it is wanted, it is ploughed in with very little loss, and the land benefits by the treading of the sheep. Advantage is taken of the nitrogen-accumulating powers of leguminous plants to enrich the soil, and large quantities of both mutton and wool are produced. It is important to remember, however, that the folding of sheep only enriches the land in phosphates and potash when considerable quantities of artificial foods are fed. The quantity of lime added to the soil even when these foods are fed, is small. The light land farmer, by taking every opportunity of adding potash and lime as such to his soil, when he has reason to believe it is poor in those ingredients, will in all probability much increase its productivity. Heavy folding, even with plentiful cake and corn, does not make up for poverty of the soil in lime, but it undoubtedly adds considerably to the stores of the other essential plant foods. Folding without artificial foods or manures does not enrich the soil in phosphates and potash, but only in vegetable matter and nitrogen.

Fruit Growing.—Fruit growing has undoubtedly many possibilities, even on poor, light soils. At Hollesley Bay Labour Colony a large area of light soil has been planted with fruit, quite a considerable stretch of derelict heath land having been utilised for this purpose. The results obtained have been wonderfully good, and the colony has now hundreds of acres under fruit, and that grown by them is amongst the finest produced in England or in any other country.

Sandy Heath Land.—A large strip of sandy heath land, stretching nearly the whole length of the county, a few miles from the sea, consists of poor, light soil probably better suited for forestry than for agriculture. At present it produces practically nothing.

Lupins.—In various parts of the county there also exist areas of poor light land, which are only just on the margin of cultivation. On such land lupins are a very useful crop, although in a dry season even they fail. If, however, a good crop of lupins can be ploughed in, a fair crop of rye may often be obtained as a following crop.

Chalking.—Much of the poor light soil of East Suffolk is very deficient in lime, and remarkably good results have followed the application of chalk. There are extensive chalk pits at Bramford and Claydon, near Ipswich. The usual custom in the past has been to apply from 12 to 40 tons of chalk per acre. At present the cost of obtaining and transporting the chalk where required is almost prohibitive, even if the labour could be obtained. Unfortunately also, many of the districts where it is most required are some distance from a railway.

It is worthy of note that a large owner of light land in East Suffolk has become so thoroughly convinced of the value of chalk on his estate that he has purchased a field about 10 miles away, in which the chalk is close to the surface. After the War he proposes to open a quarry there to deliver the chalk by means of a motor lorry to various portions of his estate, direct to the farms where it is required.

The question of the smallest quantity of chalk or lime per acre which can be applied with satisfactory results is one which requires further investigation. Dr. Russell* estimates the annual loss at about a load and a half per acre per annum. He also states that in the counties round London in the old days the dressings were 80 to 100 loads per acre, but that nowadays dressings are smaller—about 50 to 60 loads per acre. Of late, considerable quantities of ground Buxton limestone, applied at the rate of 1 to 2 tons per acre, have been used in Suffolk, and possibly if the local chalk could be similarly ground, and applied by means of a manure distributor, results might be obtained which, although only temporary, might be sufficiently good to induce the tenant farmer to practice this method, owing to the comparatively small initial expense involved.

From an inquiry conducted by Mr. W. A. Cox of the Food Production Department, and the writer, it appears, that ground chalk could not be placed on the market in East Suffolk at the present time at much less than 20s. per ton, bags

* "Chalking: A Useful Improvement for Clays overlying the Chalk," E. J. Russell, D.Sc. This *Journal*, October 1916.

extra (returnable). Lump quicklime could be produced from the chalk at about 30*s*. per ton. Since dry chalk only contains about half its weight of quicklime, it is evident that lump quicklime at 30*s*. per ton is much cheaper than ground chalk at 20*s*. The quicklime could be reduced to a fine powder by slaking, and sown with a manure distributor or spread from small heaps, as described in Leaflet No. 170 of the Board of Agriculture.

In East Suffolk, "crag" obtained from local pits has, in the past, been largely and successfully used as a source of lime. It consists chiefly of broken shells, and was applied at the rate of 20 loads and upwards per acre.

The effect of chalk is most evident upon certain crops, particularly on clover and lucerne. The writer examined a field on the farm of Mr. Wm. Paul, at Hemley, recently. Part of this field had been chalked 10 years previously and part had not. The difference between the two portions was remarkable. The crop was clover, and on the portion chalked there was a good plant, whilst the part unchalked consisted largely of sorrel. By the courtesy of Mr. Reynolds, Mr. Paul's steward, the weight per acre of the two portions was ascertained. On the unchalked part the yield was 14 cwt. of hay per acre, consisting largely of sorrel, whilst on the chalked part 26½ cwt. per acre were obtained, consisting almost entirely of clover. A difference of this kind in the course of years is certain to exert a profound influence on the fertility of the soil, owing to the larger quantities of vegetable matter and nitrogen stored up in the soil by the heavier crops of clover.

Dr. Russell very kindly investigated a case in the Parish of Leiston which is in many ways typical of the poor, light soil of the district. On the soil in question it was found that lucerne grew in patches; in some places it grew quite well, whilst in others it would hardly grow at all.

Dr. Russell* kindly analysed the soil on these patches and ascertained that the amount of carbonate of lime on the patches where the lucerne grew well was 0·8 per cent., while that on the patches where the lucerne would not grow was only 0·07 per cent. It is evident, therefore, that on soils of this type the application of lime or chalk is almost essential to success. Once one can get lucerne or sainfoin to grow the problem of the improvement of these soils is almost solved, as these crops enrich them so much that the succeeding crops are almost certain to be fairly good.

Typical Poor, Light Soils.—On the poorer light soils of the county, almost every plant food appears to be present in very small quantity, although, as previously noted, certain (though not all) Suffolk light soils contain phosphates in abundance. The typical poor, light soil is undoubtedly very poor in vegetable matter, in lime, and in nitrogen, potash, and phosphates. In a district with a rainfall as low as that of Suffolk this poverty in vegetable matter is fatal to the successful production of crops. The crops fail at a critical period owing to drought, when the presence of ample supplies of vegetable matter would possibly hold the moisture and enable them to survive.

Ordinary grass, on such soils and with an average season, produces very little and in some seasons almost nothing. Very fair results have, however, been obtained on some farms from modified Elliot's mixtures, containing the various plants suggested by Elliot as deep-rooting and drought-resisting, and in addition a few pounds per acre of lucerne. In such mixtures kidney vetch usually succeeds fairly well. It is doubtful, however, if such mixtures possess any advantage over lucerne, although they are useful for a change.

If ample supplies of farmyard manure were employed no doubt these soils could be much improved, but unfortunately they are not available. The productivity of the soil is at a very low level, and consequently very small yields of straw or green stuff are secured, and very little farmyard manure is made. Lupins, which grow fairly well in a moist season on even the poorest of light soils, are excellent, if ploughed in green, as a source of both vegetable matter and nitrogen.

Ensilage.—As with the poor, heavy land, so with these poor, light soils it is probable that the introduction of modern methods of ensilage will lead to increased productivity. On poor, light lands, probably oats and tares, lucerne, sainfoin and maize are the most suitable crops to grow for ensilage. Maize, if well manured, grows with astonishing luxuriance on light land, and in a favourable season has grown as high as a man on horseback on land that is worth only a few shillings an acre rent. Silage would almost certainly render it possible to keep more live stock, and by so increasing the quantity of farmyard manure available would help to conserve the vegetable matter in the soil. Where leguminous crops were grown for silage the farm would be enriched in the nitrogen it so badly needs.

Potatoes.—There can be little doubt that, given suitable manuring, remunerative crops of potatoes can often be grown

on some of the moderately poor, light soils. In 1917, 16 tons of potatoes per acre were weighed on a poor, light soil which in all probability, in a normal year, would not yield more than 5 or 6 sacks of barley per acre, and probably not more than 4 sacks of wheat.

Potash.—The supply of potash in the quantities required is an insuperable difficulty at the present time. The figures obtained at Bramford show the great need for potash on these light soils, and there can be little doubt that potash is in many cases second only to lime in importance. Given an ample supply of these two plant foods, there appears to be no reason to doubt that, by making full use of the nitrogen-accumulating powers of leguminous crops, and by taking every possible opportunity of enriching the soil in vegetable matter, by folding sheep on the land, by ploughing in green crops, and by making as much farmyard manure as is reasonably practicable, the productivity of large areas of light land which at present contribute little or almost nothing to the food supply of the nation, could be vastly increased.

Artificial Manures.—Emphasis has been laid upon the importance of artificial manures in the improvement of poor land. These manures have sometimes been regarded as mere stimulants. This view is incorrect. There is no simpler or better way of increasing the productivity of a poor farm than the judicious use of chemical manures. By this means larger crops of straw, hay and roots, as well as of corn, are obtained, so that much more livestock can be kept and more farmyard manure is produced. In this way the fertility of a farm tends to increase.

The Influence of Livestock.—The influence of livestock upon the improvement of land is an important one. It is a matter of common knowledge that the more stock are kept on a farm the more corn it is likely to grow.

Pigs have been kept in enormous numbers in the past in Suffolk, and the manure they have produced has reacted most favourably upon the productivity of the land. They were fed largely upon imported foods, and their numbers have, of necessity, been much reduced of late. An attempt is being made by many farmers to keep on a fair stock of pigs by grazing them, or folding them on green crops. A number of breeding-sows were seen recently folded upon a mixture of trefoil, rye-grass and lucerne. They were in fair store condition and received nothing whatever but the green food and some whey. In all probability it will be necessary for some time to come to maintain our stock of pigs upon home-grown products to a

much larger extent than has been done in the past, but it is most important for the stock to be maintained at as high a point as possible, both from the point of view of our meat supply and of the fertility of the land.

Sheep are valuable because they produce both mutton and wool. The great benefits conferred by a flock of sheep upon light land have already been alluded to: they are kept upon the arable land all the year round and the skilled flockmaster grows a succession of green crops for their consumption. Sheep are also kept on heavy land, very profitably, by certain farmers. In the winter they live upon the grass land, whilst in summer they are folded upon the arable land. This proceeding undoubtedly has a most beneficial effect upon the soil. The manure also is produced where it is wanted—an important point in the case of fields some distance from the homestead.

Cows are increasing in Suffolk. After its productivity has been increased by basic slag, much of the poor, heavy land is essentially suited for cows. The growing of such crops as lucerne and tares enables a large number of cows to be kept on a farm with only a small proportion of grass. In districts near a railway it will no doubt be found most profitable to sell milk, but in the remoter parts cheese-making might be practised much more than is the case, either as a domestic industry or by means of co-operative cheese factories.

THE PROBLEM OF INCREASING THE AREA UNDER TILLAGE.—With the principal difficulty in this connection, that of labour, it is not proposed to deal here. There are, however, very serious problems involved in the actual finding of land suitable for breaking up.

As before stated, there were in 1916, 129,176 acres of permanent grass land in East Suffolk. Of this, probably quite 25,000 acres are marshes, *i.e.*, low-lying grass land, totally unsuited for the plough. Of the remainder, probably 50,000 acres are heavy land recently seeded down—land which was thoroughly farmed out when in arable cultivation and has now been allowed to go down to whatever grass it will grow. Since going down to grass the ditches have been in many cases neglected, and the land is now in a more or less water-logged condition.

If labour were available to clean out the ditches, mole-drain the land, and make a summer fallow of it with the aid of the steam cultivator, much of this land might, in a favourable season, yield 3 qr. per acre of wheat the first year, without any manure. If 5 cwt. of basic slag were applied in the autumn

and 1 cwt. of sulphate of ammonia in February, the yield might very well be increased under favourable circumstances to 4 qr. per acre, or even more. Subsequent crops would need to be continually manured, as the land is very poor.

In view of the scarcity of both labour and manure, the prospect of breaking up land of this type is not very attractive, either from the point of view of the farmer or of the nation. It is, however, probable that land of this type, which was under the plough until a few years ago, is less subject to wireworm attack than land which has been in grass for a number of years.

At the present time, when food is wanted immediately, the land selected for ploughing should be such as is likely to grow a good crop. With every prospect of scarcity of both farmyard manure and artificials, it is useless to expend what limited horse and man power is available on land which will grow very small crops. The amount of labour which must be expended on very poor heavy land is at least as great as that on better land. As much or even more seed is required, but the crop is only one-half. Of useful upland grass, which could have been ploughed up in the autumn of 1917 with a prospect of obtaining good crops without manure, or with very little, it is probable that not more than 50,000 acres were available in East Suffolk. Quite a large proportion of this consists of the two or three home fields clustered around the 3,000 homesteads of the county. It is evident, therefore, that the difficulty of finding the quota of grass land asked for was very considerable. The available land was very small in area, and much of it was so situated as to make it extremely difficult for a farmer to break it up. Every practical man knows how inconvenient it is not to have a few home grass fields in which to turn horses and other stock during the summer months. The industry of cow keeping, too, has made considerable developments during the past 20 years. Large quantities of milk are sent to London and to the East Coast seaside resorts. This adds to the difficulty of finding suitable grass land for ploughing without making inroads upon the essential industry of milk production.

GENERAL.—We have now considered in some detail a few of the problems arising in connection with the effort to make our country more self-supporting in the matter of food. An examination of English agriculture makes it clear that our land does not produce anything approaching the quantity of food which it might do. There are many causes for this;

out of our system of land tenure and kindred subjects occur; some economic, such as those connected with the period of low prices, in the "'nineties." It is outside the scope of this article to deal with these problems. There are, however, other problems very difficult of solution which arise directly in connection with the cultivation of the soil. An endeavour has been made to point out some of these problems. One of them has not yet been dealt with, and that is, why one man should be a bad farmer and another man a good one. The problem is an important one, for it is probable that there is on an average at least one bad farmer in every parish in England. The chief cause of bad farming undoubtedly is the individuality of the man, but there are other causes.

The work of the War Agricultural Committees shows that there are many occupiers of land who do not understand farming. Many persons who occupy land have never had any training whatever in farming. They have had various other businesses, but for some reason or other have forsaken their first love, and followed after agriculture. Others have been brought up to farming, but, owing to lack of capital or lack of knowledge of the elements of agricultural science, or of opportunity of observing really good farming, have failed lamentably to make the most of their land.

This bad farming did not, perhaps, matter very much so long as we could import as much food as we wanted and had plenty of money to pay for it, but now things are different. The land of the British Islands is very limited in quantity, and the State has already decided that it is not in the national interest for men to neglect their land: many who have done so have been summarily ejected from their farms.

Since prevention is better than cure, it is obviously far better to do all that can be done to prevent the making of bad farmers in the future, than to be compelled to deal with them after their inferior methods have borne fruit. It would be a great advantage if the boys of the present generation, who will be the farmers of the future, could all have at least two years' practical training on the farm of a good farmer. A large proportion of the youths in question would get their training on the farms of their fathers. Those whose fathers were not good farmers would learn much by seeing better methods of agricultural practice elsewhere. All boys intending to become farmers would also greatly benefit by a training of at least six months' duration at an approved Agricultural College or Winter School of Agriculture.

Mr. Prothero* tells us that "in its hour of need agriculture found in Science its most useful help." As Science proved the friend of the farmer in the past, when the problem which confronted him was low prices, so she will prove his friend when the problem is how to produce food for the Nation, now and in the future. If our country is to be more self supporting in the matter of food, we must have a truly scientific agriculture—the best practice associated with science. It must be recognised that our best farming practice is widely different from our worst, and that a certain proportion of our worst farmers have neither practice nor science. To train up future generations of farmers so that they have at least a fair chance of learning both good practice and good science will surely be an important contribution towards the solution of the national problem of how to make the land grow more food for the people.

THE TAKING OF WILD RABBITS.†

PART II.

R. SHARPE.

FERRETING.—Taking Rabbits Without Cruelty.—The process of bolting rabbits by means of ferrets and catching them in nets as they seek to escape is considered by some to be the only really humane way of taking rabbits. The ferret and net system cannot be classified as a humane method of taking rabbits when they exist in a really wild state. Even though the ferrets are muzzled they scratch or "flog" any rabbit which is tucked up at the end of a hole until its back is quite raw. There is also to be borne in mind the fact that even a muzzled ferret must be allowed some play of the teeth, otherwise it will refuse to work. Even if the teeth open only a little way, there is sufficient liberty of movement to enable the ferret to bite a rabbit, the favourite hold under these conditions being by the eyelid. Evidence in this sense is obtained when rabbits so maltreated escape for the time being and are caught later on. The bite of a ferret resembles that of a rat, in the sense that the wound festers. Even in the case of a rabbit which has been "flogged" by a ferret whilst the rabbit is tucked up at the end

* *English Farming Past and Present*, Rt. Hon. R. E. Prothero.
† Part I. of this article appeared in the June, 1918, issue of this *Journal*.

of a hole, a "scab" as big as the palm of the hand is found on the back or rump, always, of course, assuming that the rabbit escapes at the finish. Much as I regret to say so, I fear that it must be admitted by all fair-minded persons that there is at present no known means of taking wild rabbits without causing a certain amount of suffering. Even when the gun is used there must always be a certain number which escape, to suffer a lingering death. Broken legs must cause pain until they become callosed, but it is astonishing how soon this process sets in. Clean and workmanlike killing on the lines I have endeavoured to expound in these notes is the only means I know of for giving effect to humane intentions.

Value of a Good Terrier.—Good terriers or spaniels are of very great value in dealing with rabbits, for they often save a lot of valuable time and labour in locating ferrets and rabbits underground. A dog of the right stamp of intelligence will very soon become "true to hole," unerringly marking any small hole that contains a tenant and being equally certain of passing by those which are unoccupied. This alone saves much loss of time. A good dog will soon learn to pounce upon a rabbit that bolts into the net, and so prevent its escape, for no matter how carefully purse-nets are laid loose sticks and brambles often prevent a rabbit-tight joint being made. A dog which has learnt this accomplishment should always be allowed to sit on the top of the burrow, the position allotted being for preference fairly central, to enable the dog to signal the first move of the rabbit or the action of the ferret in striking at it. The dog moves its head in listening to the underground movements. As these make a rumbling apparent to the human ear, how much more must they tell to the acute senses of the dog?

Ferrets on Line and Free.—Some rabbit-catchers use nothing but the line ferret whilst netting, but my own practice is to rely more particularly on a loose, muzzled ferret; the reason being that if a rabbit is at all inclined to bolt, a ferret unhampered in its movements may follow it up more quickly and so at once bring off a capture. A line ferret by contrast may find a difficulty in pulling the line sufficiently quickly round twists and turns to keep the rabbit on the run. Even when rabbits are not bolting well the loose ferret will drive them into blind alleys, where, perhaps, the whole contents of the burrow may be collected. A single digging will then bring a nice haul within arm's reach. Should a line ferret be used in similar circumstances, it will kill the rabbits singly as it rounds them up

one by one, and as many separate diggings will be called for. The line ferret is nearly always a big, powerful chap, usually a certain killer, as all good ferrets should be. For my part I do not care for a big ferret for use on a line. The idea that such is necessary may be assumed to follow from the belief that its greater strength enables it to pull the line round corners. But the trouble comes in when the line ferret kills a rabbit in a narrow part of the burrow, often in a place where it cannot be recovered without hours of labour. In such cases one would prefer to pull the ferret out and proceed to a fresh spot, but the size of the ferret prevents it passing beside the rabbit in response to the pull on the line. All told, a small ferret is to be preferred for line work. Not only can it be got away quickly from a kill, even when it has passed beyond it, but, in addition, its slender dimensions enable it to climb over a rabbit and get at the head. This is often a help, for the rabbit may be driven back towards the mouth of a hole.

Ferret Line.—I mostly use a line six yards in length. If made of proper material any ferret can drag it along for the full length. Failures in this respect are often caused by the line not being paid out sufficiently freely. A single moment's tightness will cause the line to cut corners, so entering crevices or cutting into the earth in a manner which multiplies friction. Too loose a line is also to be avoided, because the loops which are then liable to form may get entangled round rocks or root stumps. The happy mean is attained by allowing the line to run freely through the finger and thumb of the right hand, the contact so established with the ferret permitting all its movements to be noted. For instance, preparatory to striking at a rabbit a ferret always make a stop. The novice will learn to detect these symptoms just as an angler can tell from the sensations conveyed through the rod what a fish is doing with the bait. There is nothing I like better for a ferret-line than a good class of blind-cord of medium thickness. The fact of its being plaited gets rid of the tendency for kinks to form, these being associated with every kind of twisted rope. Such a line will last an entire season, assuming any ordinary amount of work; that is to say, it will suffice for the man who, working with traps and snares, turns only to ferrets and nets or gun when weather brings the other methods of capture to a standstill. An alternative to blind-cord is a length of round lamp-wick of the kind which is used for the cheap paraffin lamps which are to be seen in cottages. Being made of plaited cotton the wick

Marking the Line.—It is always advisable to have the line marked so as to show the whereabouts of the ferret. The first mark should be placed at 18 in., the next at 1 yd., and the others at yard intervals to the end of the line, each mark to be distinguishable from the others in the manner of the fathoms on a "log." Many men simply knot the line; but this is wrong because it spoils free running, and will act as a solid stop if the line enters a crevice or an angle formed by tree-roots. There are many such places in rabbit-holes. Arduous digging is the final penalty for any time saved by marking the line with knots. The best plan is to affix the marks by working thread in amongst the cord strands, using a needle for the purpose. The loops should be left long, so that when cut off they form tassels. These offer the least possible resistance to the free motion of the line. Such marks are invaluable as an indication of the position of the ferret and the amount of top earth that needs removing to reach it.

Muzzling Ferrets.—I prefer to use a home-made string muzzle for this purpose, never those of the metal or leather kinds, which do not stay in their proper place, while the metal ones cause discomfort to the ferret, and any irritation of this sort interferes with its proper working. When wearing a properly-attached string muzzle a ferret will work with comfort and keenness. The contrivance is easy to make, ordinary white kitchen string being the best material to use in making it. To prepare and fit a muzzle, take two pieces of string, from 12 to 14 in. long, lay them together and knot them (as if they were one) about 6 in. from one end; then form a similar knot about three-quarters of an inch away from the first (or 1 in. for a long-headed ferret); after that bring the two longest ends, necklace fashion, round the ferret's neck, making a knot on top, and leaving the first-made pair centrally below. A second person holds the ferret round the shoulders whilst all this is going on. The two other ends are then pulled forward so that the second of the pair of knots is drawn under the ferret's chin; the free ends of string are then brought around the ferret's muzzle (snout), so that they meet on top, where they are tied; the final knot, joining the four free ends of string is then made between or slightly above the ferret's eyes. A muzzle so made, with the various parts drawn to the required tightness prior to locking the knots, acts perfectly. In trimming off the loose ends they should not be cut too close for fear a slight drawing of the knots may untie them. When the day's work is done the muzzle should be removed by cutting, fresh string being

required for each occasion. I have known and tried many other ways of making muzzles, but the above has been proved by continued test to be at once the most serviceable and, for the ferret, the most comfortable. Muzzling ferrets by sewing their lips together is vilely cruel, but fortunately the practice has no utility to recommend it.

Recommendation of a Spear.—Among the accessory tools of ferreting none is more useful than a spear. It is made of a round bar of steel pointed at one end and at the other bent in the manner of a meat-skewer to form a handle. Its length is about 3 ft., and the diameter a full three-quarters of an inch. No man who ferrets regularly should be without this implement. With it he can locate a hole underground by pressing it into the ground, in just the same way in fact that mole runs are found with a walking-stick. A certain amount of caution is necessary in prodding at ground which is supposed to overlie a hole, for if too much force is used the sudden jump which occurs when a cavity is entered means that the spear drives in so quickly that it may impale ferret or rabbit—that is if a kill happens to be going on just below. With a little practice the hole can be felt for quite slowly, with the result that rabbit or ferret, as the case may be, gets pushed out of the way. When an extra deep dig is in prospect the spear saves a lot of trouble, for by exactly locating the hole it gets rid of the annoyance of occasionally digging deep down and finding at the finish that the hole sought has been passed on the way, perhaps the thinnest of partitions hiding it from view. This is especially liable to happen when, the ferret having already killed the rabbit, there is no sound to guide the digger. The sole noise then remaining is that the ferret makes whilst eating the rabbit, and the ferret is not noisy in taking its food.

The Ferreting Spade.—Two sorts of spades, or grubs as they are often called, are required when ferreting. My selection has always been, first, a short-handled spade for ordinary digging, and, second, the long-handled Norfolk graft or digger. This last is a really wonderful implement, and the most usefnl of all the spades which have ever been proposed or made for digging out rabbits. The one I use is 7 ft. in length, and it carries at one end a small scoop-shaped blade, and at the other a crook, or it might be called a hook. Tremendous purchase is given by the great length of shaft, and the entire weight of the body can be thrown into digging in most difficult places. The crook is invaluable for drawing out dead rabbits beyond the reach of the arm, also for drawing up the line when its presence

has been detected far away from the hole where the ferret was first inserted. When a hole has been broken into, the blade of the spade should be exchanged for the crook end, which may be used for raking the bottom of the hole. If the line is touched its presence can be felt, and it may be drawn up from depths otherwise beyond reach. In digging with this spade the hole should be made at a slope of 30 to 35 degrees, care being taken to keep it about the size of the spade, so that in drawing back the spoonfuls of earth none will fall off the sides. The upward tilt of the blade assists this removal of material from steep-angle holes. With a very little practice depths of 5 or 6 ft. can be penetrated, rabbit and ferret being drawn out with the aid of the crook. Longer shafts can be laid on theses spades than that named, but they are only needed on the sand hills of the Eastern Counties.

NETS.—In selecting the kind of net to use for taking rabbits, regard must be had to the nature of the burrows that have to be attacked. Where only small breeding holes have to be dealt with, or burrows having half-a-dozen outlets—say twelve as a possible maximum—then I should plump for the purse-net. These should be of an ample size, and have reins running right round them, with a peg at the extremity, so that they may be securely fastened. Small purse-nets are the cause of a lot of losses, as they are somewhat easily knocked on one side. Good, sizable nets are also quicker to lay. They must be made with proper netting string, otherwise they kink and twist into all sort of shapes. The right size of net made of the right material will hold "Bunny" without hope of escape. When netting the large burrows which are to be found on the commons of such counties as Dorset and Hants, and the downs of Wilts and Sussex, what are known as "flambs" are, perhaps, to be preferred to purse-nets. To stop each hole with its own separate purse-net requires a lot of time. In saying this I have in mind burrows with anything up to 100 or 150 outlets. "Flambs" are simply square nets with the meshes gathered across each end and tied. They are about 3 ft. square, and are laid loose over the holes. A large number can be laid in a comparatively short time, owing to their size and the fact that no pegging is required. Care must be taken to remove any loose sticks away from the front of the holes, otherwise they hold the net in one place so that the rabbit is able to disentangle itself. When using flambs a good dog is essential, for unless a rabbit is pounced upon, the moment it becomes entangled in

Digging Operations.—Though much was said about digging when describing the spade, some special remarks are desirable apart from that connection. Ferreting mostly resolves itself into dealing as quickly as may be with the unavoidable interruptions to smooth working. As soon as a ferret is judged to have made a kill underground, the tendency is to start in haste digging with the spade. The disturbance so caused may induce the rabbit to make violent exertions to rid itself of the ferret, and this it often does. Even when the worker is certain that the ferret has gained a firm hold, he would do well to take a little time to locate the exact spot. This can be done by placing the ear to the ground, but even better is to plant the spade in the earth near where the rabbit is thought to be and to place the ear on the top of the handle of the short spade, or at the side of the long one, if that is in use, and to listen carefully. The sound is conveyed very clearly through the spade-handle so that with a little practice the novice can soon learn to locate the exact position. If the sound is judged to be insufficiently clear at one place, the spade may be moved to another and the test be repeated. The point where the sound is most clearly heard will, in that way, be quickly decided. If the rabbit is still struggling, the bumping is felt as if it were actually at the end of the spade itself. The more usual method of placing the ear close to the ground is all very well in a dry season, but when snow is about or when working on wet clay the sounding post is to be preferred. When the hole has been made and the rabbit removed the ferret should be carefully drawn out and its feet be thoroughly cleaned. It is then ready to be put back into the same hole. The precaution of cleaning the ferret's feet should never be omitted, for if there is another rabbit at the end of the hole and the ferret cannot get at its head, rump-scratching will be immediately resorted to. The fresh supply of fur so collected on the ferret's front feet will thus give information which would not be available if the ferret had been returned to the hole with fluff from the previous rabbit still adhering to its toes. Should the hole be empty, that fact is also made obvious.

Always Fill in after Digging.—The mention above of large burrows involves a stern warning to all persons engaged in ferreting as to the necessity of making good any disturbance caused by digging. If that is not done large burrows become larger by the constant opening up of new communications, and they soon pass beyond manageable limits. I always make it a strict rule to fill in afterwards all holes that have been dug out, firmly treading down all the returned earth. The prompt

repair of all disturbance caused by digging soon brings fresh tenants to the burrow; but if it is left, as I fear is too often the case, months may elapse before the rabbits again take up their abode in their rudely-disturbed quarters. Rabbit earths, to be snug and warm, must possess a suitable system of ventilation; and there can be no doubt that the piercing of new exits and entrances will upset the plans made. Before the home is again suitable for occupation the existing system of holes must be extended, new openings made, and so on. If a human dwelling-house had a hole pierced in the roof either it would have to be repaired at once or fresh apartments would have to be provided. For the rabbit, extensions are the only resort.

Ferrets Lying Up.—At times a ferret will lie up in a position *from which it cannot be recovered by digging.* When this happens all holes should be made secure, and in the mouth of the one from which the ferret is judged to be most likely to emerge should be placed the ferret bag containing a nice straw-bed. A rabbit's paunch should be placed beside the bag so as to provide a definite lure. When all is complete this hole also should be stopped so that the ferret cannot by any chance escape. Nine times out of ten the ferret will be found next morning snugly curled up in the prepared bed. Should the odd occasion arise, a line ferret should be run into the hole, as there is a possibility that a rat or rabbit nest may be the chosen place of rest. Usually the line ferret will disturb the sleeper, so that it follows its companion when the line is drawn in. The waiting tactics may often be avoided by having available a few blank cartridges loaded with a liberal charge of black powder. No stopping of holes is in these circumstances necessary. The muzzle of the gun should be held 4 or 5 in. away from the selected hole, the discharge carrying the smoke well into the hole. A turf should at once be placed over the opening to give the fumes an opportunity of penetrating to the utmost recess of the burrow. As no animal likes smoke, the ferret will in all probability abandon its idea of taking a rest and make a hasty exit *viâ* one of the available side doors. Another excellent plan for inducing a ferret to leave a hole is to paunch a rabbit whilst quite hot and at once to place the attraction in a hole specially chosen, so that the wind may waft the odour into the burrow. Few ferrets are able to resist such a lure. Yet another plan is to wind the thin part of a rabbit paunch on the end of a long stick, and push it right down the hole. When the ferret nibbles the bait the tug is immediately felt, and the "line" may be drawn in gradually until the ferret is within reach.

When Ferrets Must Not be Used.—The use of ferrets after the rabbit-breeding season has commenced is not to be recommended for several reasons, unless, of course, no other means of capture are available. When rabbits have begun to breed the bucks become what is termed "rank." This a ferret does not like, and although it may work for a time early in the day when stimulated by hunger it soon tires of the objectionable task. At the season in question the does very often take refuge in the blind ends of holes, so as to be able the better to protect themselves against the worrying attentions of the bucks. For this reason the bucks are generally first encountered by the ferret, the two being thus driven into a corner, so to speak, with the doe at the back. The doe which is not rank is thus screened by the buck, and apart from the ferret's natural disinclination to tackle the buck at such a season, the buck indulges in a peculiar system of warfare to which the ferret has a strong aversion. Literally it sprays "urine" in the face of the advancing ferret. Confirmation of the belief that the bucks are the difficulty is to be found in the fact that four out of every five rabbits taken at such seasons are does. Favourable conditions for improving the quality of stock only exist when the surplus of bucks can be removed, and the curious circumstances related in this note go to show that ferreting left till too late in the season accentuates the evil of a surplus of bucks.

Shooting Bolted Rabbits.—So far I have only dealt with ferrets when used as a means of driving rabbits into nets. When using them for bolting rabbits for shooting, careful attention must be paid to wind direction. Otherwise good results cannot be expected. A most excellent way of deciding the direction of even the gentlest breeze is to pluck a fluff of rabbit hair from one already bagged, and to note which way it drifts when released from finger and thumb. No matter how slight the air movement may be any human contamination will be circulated in the burrows below ground, so giving warning to the rabbits that danger threatens. The novice-shooter who studies his own comfort regardless of the effect produced will nearly always take his stand in a position which enables him to turn his back to the wind. As he must face the burrows, he unconsciously gives the rabbits his "wind" from the very commencement. Good results require from the shooter that he shall face whatever wind is blowing, otherwise the rabbits will promptly retire to the depths of their holes, and will take their chance with the ferrets rather than show themselves above ground. A hedgerow should always be worked

up wind if the air-current is in the slightest degree up and down. For ferreting with the gun a dog with thorough mastery of the duties required is most useful. It will often save hours of digging by promptly securing wounded rabbits which would otherwise struggle into a hole. So serious are the delays occasioned by putting ferrets into holes known to contain wounded rabbits that those out for sport alone often fall under the temptation of passing by such places. A wounded rabbit will not only itself refuse to budge, but the others in the same burrow become equally obstinate. A ferret which is put into a hole containing a wounded rabbit will attack it in preference to any others that may also be present. Digging is thus nearly always necessary; so that a dog of the right stamp and training adds materially to the day's results. Burrows to be ferreted should always be approached in the stealthiest possible manner, conversation, of course, being avoided, as well as all unnecessary movement. On no account should the ground be walked over beforehand, no matter how great may be the desire to obtain a general geography of the burrow. Such surveys are at all times unnecessary, because the ferret should always be introduced at the first hole on the outer edge of the burrow. Having the wind in its face it will at once scent any rabbits which may occupy the hole. A very common mistake made by an astonishing number of those who follow this sport is to give vent to their impatience and excitement. Without realising the harm they do, they chatter and argue over the burrow, perhaps in an endeavour to force the ferret to enter a particular hole. Absolute quietness is essential, simply because the whole spirit of ferreting is to make the rabbits believe that the foe which attacks them in their home is the only one they have to fear. If given no reason to think otherwise, they instantly seek safety in flight.

THE following statement published by the Department of Agriculture and Technical Instruction for Ireland was received too late to be included in the June issue of this *Journal*:—

Ireland as a Food Supplier of Great Britain.

With a view to encouraging the Irish agriculturist by bringing home to him the part he is playing and can still further play in food production and, incidentally, the importance of the market at his door, and with the object of making better known in Great Britain the place Ireland is taking as a supplier of food for the British population and the Allied Armies, the Department think it desirable to publish the following particulars:—

I.—**The Importance of the Irish Food Supply.**—Ireland's production of food, including especially her supply of food to Great Britain, has for

several years past, under the system of agricultural education and administration introduced by the Department of Agriculture and Technical Instruction, been steadily growing, until ***the supply from Ireland has become the most important in point of quality, character, and proximity, arriving in Great Britain from any country in the world. Since the War that supply has been fully maintained.***

By 1913 *Ireland's supply to Great Britain* had reached a point where it was *only exceeded by that of one other country in the world, the United States of America. Since the War* the supply coming from the United States has abnormally increased, *and the Irish supply, though not in this proportion, has gone on increasing during these years also.* The following figures illustrate this position :—

Values of Food and Drink Stuffs Imported into and Retained for Consumption in Great Britain from the undermentioned Countries.

	1912. *Millions* £	1913. *Millions* £	1914. *Millions* £	1915. *Millions* £	1916. *Millions* £	
Ireland ..	30	36	37	46	59	
United States	30	39	42	82	116	
Argentina ..	31	31	27	46	36	Values
Canada ..	18	19	23	27	41	for
British India ..	22	17	13	22	20	1917
Denmark ..	20	22	23	20	20	not
New Zealand ..	9	9	11	16	18	available.
Netherlands ..	14	16	17	14	13	
Australia ..	13	15	16	12	10	
Russia ..	17	15	13	8	1	

II.—**Maintenance of Supplies since the War.**—(1) *The Irish Supply.*—Taking quantities instead of values, and comparing the average of the two pre-war years of 1912 and 1913 with the average of the last two years, 1916 and 1917, we find that Ireland exported to Great Britain the following quantities of foodstuffs :—

	Average. 1912–13.	*Average. 1916–17.*	*Percentage. Increase* (+) *or Decrease* (−).
Live Cattle	832,000	889,000	+ 6·9
,, Sheep	639,000	700,000	+ 9·5
,, Pigs	233,000	239,000	+ 2·6
	Cwt.	*Cwt.*	
Butter	750,000	720,000	− 4·0
Eggs	1,120,000	1,380,000	+23·2
Poultry	300,000	290,500	− 3·3
Bacon and Hams ..	1,220,000	1,080,000	−11·5
Oats	1,340,000	1,700,000	+26·9
Potatoes	3,000,000	3,460,000	+15·3
Biscuits	340,000	420,000	+23·5
Yeast	140,000	220,000	+57·1
Condensed Milk	260,000	240,000	− 7·7
Forage	485,000	726,000	+50·0

It will be seen that the items in which there is a net decrease, viz., pig-products, dairy produce and poultry, ***are those directly affected by the reduction of the import into Ireland of feeding stuffs from abroad, such*** as maize, cattle-cake, etc. Ireland normally imported about 800,000 tons of these feeding stuffs annually ; in 1917 the import was ***reduced***

to 500,000 tons and has since almost ceased. This loss of imported feeding stuffs, although partially replaced by home-grown, is bound to affect both the live stock and live stock products. The above rate of export of live stock in 1917 to Great Britain has only been given at the cost of a draft upon the capital reserves of live stock. At the same time, notwithstanding the reduction of imported feeding stuffs and the withdrawal from grazing of 637,000 acres of grass (ploughed in 1917), Ireland has maintained her live stock export; while in addition, out of her 1917 crop she has supplied to date (May, 1918) to Great Britain and to the Army: 5,100,000 cwt. potatoes; 900,000 cwt. hay and straw; 1,700,000 cwt. oats, and has furnished 600,000 cwt. oats for manufacture into oatmeal.

(2) *The Supply from other Countries.*—Taking as near as possible the foodstuffs imported from all foreign countries and British Possessions into Great Britain (imports into United Kingdom minus total imports into Ireland) we get the following figures (the classification is not the same; but it is the nearest possible. The figures are the latest available published figures):—

	Average. Tons. 1912–13.	*Average. Tons. 1916.*	*Percentage Increase (+) or Decrease (−).*
Beef, fresh	423,000	353,000	− 16·5
Mutton, Fresh	256,000	182,000	− 28·9
Pork „	20,000	15,000	− 25·0
Meat, preserved (mostly Tinned Beef)	44,000	94,000	+113·6
Butter	201,000	107,000	− 46·8
Eggs	180,000	51,000	− 71·7
Bacon and Hams ..	252,000	407,000	+ 61·5
Potatoes	373,000	85,000	− 77·2
Condensed Milks.. ..	57,000	65,000	+ 14·0
Margarine..	68,000	130,000	+ 91·2
Wheat	5,003,000	4,620,000	− 7·6
Wheat Flour	310,000	256,000	− 17·4
Barley	997,000	718,000	− 28·0
Oats	890,000	617,000	− 30·7
Rice	204,000	425,000	+108·3
Maize	1,614,000	1,198,000	− 25·8

III.—**Great Britain's Nearest and Greatest Food Base—Its Importance Enhanced by Present Position of the War.**—Ireland, it should be observed, grows more food for Great Britain than she does for herself, even proportionately to her population. This is her main agricultural business.

She is, in an increasing degree, *an essential base*, not only for the British food supply, but for *British agriculture itself*, whose meat-raising and dairying depend on Ireland's breeding and production.

Although having only 10 per cent. of the population, Ireland produces 40 per cent. of the cattle and 30 per cent. of the pigs of the United Kingdom.

She consumes only one-fourth of her own cattle. The rest are for Great Britain. Of the beef cattle, two out of every five killed in Great Britain were bred in Ireland.

These facts are perhaps sufficient to illustrate Ireland's importance as a food base.

But with the present position of the War, American tonnage required for the transport of troops and munitions, and the difficulties of the ocean journey for food cargoes, *the importance of this food base at Great Britain's door is enormously enhanced.*

IV.—**Results of Compulsory Tillage Scheme.**—To meet the new position of the food supply in 1917, the Department, following the appeal of the Prime Minister and the Food Controller, asked the Irish agriculturists to put forth a special effort of war food-production by breaking up an extensive new area of land.

At the same time the Department obtained a Defence of the Realm Regulation making it obligatory on any occupier holding more than 10 acres to break up at least 10 per cent. of the arable area of his holding in addition to the amount under cultivation in 1916. This compulsory power had only to be exercised in an insignificant minority of cases.

The response of the farmers was spontaneous, and with the aid of organisation through their existing County Committees of Agriculture, etc., under the system of the Department, the result given was remarkable.

Within the space of three months *a total new area of* 637,000 *acres was broken up by the plough and put under food crops.*

A new Food Production campaign has been opened in 1918, and *it is the estimate of the Department that the extra war food-production of* 1917 *will be far exceeded.* The new area under the plough in Ireland should prove to be well over 1,000,000 acres—and may even be 1,500,000 acres—more than the amount cultivated in 1916.

V.—**Orders Regulating Export and Import between Ireland and Great Britain.**—Some explanation as to the meaning of certain Orders which have been issued recently regulating exports from Ireland to Great Britain and *vice versa* seems to be called for.

These Orders have dealt with, at various times, the export of potatoes, of oats, of breeding stocks, of butter, etc., and an impression has gone abroad that Ireland, by these Orders, was selfishly retaining food within her shores and not allowing it to go to Great Britain.

The fact is (1) that *most of these Orders*—which were, moreover, not Orders merely prohibiting export, but regulating export under licence —*have been designed for the common interest of the United Kingdom* ; and (2) that they have been either imposed *after consultation with the Food Controller*, or have been imposed *at the instance of the Food Controller.*

The object of some of the Orders—those dealing with bacon and butter are examples, they were imposed by the Ministry of Food—was *to save tonnage, in accordance with an arranged plan*, by a temporary substitution in each island of a supply customarily imported by a supply customarily exported ; or, as in the case of potatoes, to *regulate*, also by arrangement, *the exportation of the produce to or from particular districts.* As Ireland imports a proportion of her own food supply there is material for a certain amount of substitution of this kind in war circumstances.

The Order dealing with butter, for instance, enacts that Ireland, during the winter months, when her own production is short and she supplies herself largely from imports from the Colonies and Denmark, should get no imports, but retain her home-produced butter, Great

Britain taking the imports usually going to Ireland. Export of butter has now been resumed in accordance with plan.

The object of other Orders, such as those dealing with cows in calf, milch cows, heifers, breeding sows, breeding ewes, etc., is *to conserve the breeding-base* of the live stock from dangerous depletion. Reference to the facts cited above as to the rôle of Ireland as a breeding-base for Great Britain will show that these are Orders absolutely *in the interests of the United Kingdom as a whole.* The supply of live stock to Great Britain for beef, mutton, milk, butter, cheese, pork, and bacon would fall to a disastrously low point, from which it could not be recovered for years, if this case of the breeding-animals was not vigilantly watched in all three Kingdoms. And, again, these breeding-stock Orders *regulate export under licence,* so that the export is not completely stopped, but is allowed periodically or all the time in greater or less extent, according to circumstances.

Almost all of these Orders, after they were enforced, came to be misunderstood in Great Britain, until a general impression that Ireland was selfishly holding up food supplies has been the outcome. The figures quoted in this statement show that there has been no such holding back of supplies. The Orders, the working of which has given rise, owing to misunderstanding, to the wrong impression just mentioned, are intended to secure that Ireland will be in a position to continue, to the fullest possible extent, her contribution of necessary food to Great Britain.

Fodder Substitutes: How Wild Vegetation is Utilised in Other Countries.

IN Germany and the Scandinavian countries especially the very serious shortage of fodder has forced the authorities to utilise any plant material that can be easily obtained. The large quantities of wild vegetation, such as heather, bracken and seaweed, which are available, have made it worth while to experiment extensively on their possibilities. The French, who are now experiencing shortage, particularly of oats, have issued very careful directions and analyses concerning seaweed, chestnuts and acorns, and vine-leaf cuttings. Very fibrous and woody material can be used by animals if the cellulose of which it is composed is finely divided first; but it will not form a food that is quite satisfying, nor will it be fattening or conduce to yield of milk. The utilisation of apparently impracticable cellulose has been carried by the Germans, and by the Swedes following them, to the extent of making fodder from wood pulp. The treatment of the cellulose in this material to make it digestible has been successful enough to tempt experimenters to try to adapt it for human consumption.

Heather.—Heather has been used in Germany quite extensively since 1916. It is mown, then chopped and dried. The leaves and flowers are stripped from the woody stalks, and these are then ground. This is Heather Meal I., used mixed with molasses and some albuminous material to fatten pigs. Still green stems containing little wood are ground into Heather Meal II., used for horses and cattle when mixed with molasses. Last year some heather was imported from Holland, and the industry in Germany seems to have spread. In a private letter from Neugraben (east of Berlin), October, 1917, the writer speaks of having acquired 3,000 acres of heath at 7*s.* per acre; 1*d.* per lb. was paid for the heather in pieces 6 in. long.

In Sweden the Fodder Bureau created, in November, 1917, a Heath Bureau to promote its collection, with headquarters at Christianstad in the extreme sonth. Last autumn the Government authorities ordered 30 metric tons, after some experiments on army horses, who ate it willingly. The experimenters stated that if harvested in the early flowering stage, with the least amount of wood possible, its food value was estimated as half that of hay; but the directions of the Bureau issued this spring are that it is to be gathered dry, not wet or frozen, and that it is "equivalent to good straw." The trade is at present uncontrolled, but the Bureau pays at the rate of $\frac{3}{8}$*d.* per lb. Two Swedish chemists who are taking out a patent for fodder cake use "heather meal."

Danish heather used to be exported, but during 1917 it has been extensively used as fodder in Jutland, Zealand, and Copenhagen. It is used directly for horses and cattle; but the Aarhus Oil Mills and the Danish Soya Cake Factory have a process of drying and crushing it and then mixing it with molasses. It is used in the army as both feeding and bedding stuff; also for firewood. Further, it is made into briquettes for fuel. There is a report that the Aarhus Oil Mill is experimenting in the manufacture of tea from heather. Denmark, however, possesses only a small area of heath land, which is being rapidly stripped.

The Austrian Central Food Bureau is this year buying large quantities of heather in Russian Poland, as experiments with it have proved satisfactory.

Bracken.—In Sweden experiments were made last summer in feeding army horses on bracken at the same time as on heather, but the results were not so good, although the horses would eat it dry. Further experiments were to be put in hand. The roots are extensively used to make a coffee substitute, being very carefully dried and then roasted. In Austria the root of the Eagle fern (*Pteridium Aquilinum*), which grows as a weed in Croatia and Bosnia, has proved an excellent fodder for pigs. In the spring of 1917 the military authorities offered 6*s.* 3*d.* per metric cwt. for air-dried, purified sound roots. It was stated that a ration of $4\frac{1}{2}$ lb. was ample for a full-grown pig.

Seaweed, etc.—Thorough investigation was made in France in May and June, 1917, on the use of the laminaires, which are common on the Breton coast. The general results were communicated to the Académie des Sciences early this year. Analysis showed the following figures:—

	*Prepared Seaweed.**	*Oats.*
	Per cent.	Per cent.
Water	14·40	12·55
Carbohydrate matter	52·90	66·80
Nitrogenous	17·30	9·10
Cellulose	11·50	8·45
Mineral matter	3·90	3·10

Experiments show that as a feeding stuff 3lb. of the seaweed material* were equivalent to 4 lb. of oats. Horses suffering from lymphangitis (an epidemic disease which is rife among wounded horses at the front) improved under this diet, and the disease disappeared. This action has been attributed by Lapicque and Legendre to the trace of iodine present; but this statement needs further evidence.

In Germany the State has monopoly rights on imports of seaweed. Grass wrack (*Zostera marina*) and bladder wrack (*Fucus*) have been

* The analysis clearly points to a dried preparation. See the Board's Leaflet No. 254 (*The Use of Seaweed as Manure*).—ED.

generally used as fodder since 1916. In September, 1917, a factory was erected in Schleswig to treat seaweed by a new process. In October, 1917, seaweed was sent from Holland to the German troops *in occupied France*, but according to a captured official document it was there being used as a substitute for mattresses. In January, 1918, directions were issued for the collection of sea grass (*Carex fucoides*). An embargo is placed upon it; the quantities cut must be reported quarterly to the Central Office for Straw Substitutes. In France grass wrack is used. . . . . .

Reeds.—In France a Ministerial Circular in July, 1917, recommended the use of fresh reeds for pigs. A reed-flour for fodder was put on the market in February, 1918. Reeds of the genus *Arundo* are dried, then pulverised and sieved. Analysis gives:—

Fatty material	10 per cent.
Nitrogenous matter	16 ,,
Carbohydrate ,, ...	15 ,,

which puts it between medium hay and very good straw. In August, 1917, the Swedish Government ordered the harvesting of all rushes by the owners on pain of expropriation. The German Government last autumn recommended the use of *young reeds* as hay, or converted into flour. The reed-hay is stated to be of good digestibility, equal to that of winter straw, and containing a little more protein.

The analysis of the War Fodder made from young reeds is given thus:—

Water	8·98 per cent.
Raw protein	8·63 ,,
Raw fat	1·18 ,,
Non-nitrogenous products	43·17 ,,
Raw fibre	28·97 ,,
Ash	8·07 ,,

It is sold at 28 M. per 100 kg.*

Mention is also made of the sea-rush (*Bolboschœnus maritimis*), of which the part above the ground has the same value as straw, but the tubers are equal in value to horse-chestnuts; and of the pond bulrush (*Schœnoplectus locustus*), the horizontal roots of which form good starchy fodder.

Leaf-fodder and Twigs.—The use of foliage, twigs, and young shoots of any trees and shrubs has been largely developed in Germany since 1916, when it was spoken of as greatly neglected. An Order about the collection of leaf-hay and twig-fodder was issued last December, and further directions given in February. All trees and shrubs may have their cuttings utilised except bird-cherry, laburnum, ivy, acacia, alder. Another set of directions recommends acacia and alder, with ash, poplar, birch, lime, beech and hazel-nut, also fruit trees and shrubs. The material should be collected in winter, before the buds burst. Sheep and goats can eat it unchopped; for other uses it should be cut fine in a chaff-cutter and used wet or dry; but it must be kept dry if preserved at all, otherwise it will mildew. This year it will be collected officially; owners of gardens, woods and parks, and the administrators of State forests are enjoined to organise the cutting and collection. In Austria the Fodder Substitutes Department offered in February, 1918, to purchase cuttings from ash, poplar, birch, lime, copper-beech, aspen, hazel, hornbeam and redwood. It is recommended that these

* Say 14s. 3d. per cwt. at 1 M. = 1s.

should be pounded and ground. In France directions are given only for vine waste, with the following analyses :—Branches, equivalent to ordinary hay, 7–8 per cent. nitrogenous matter ; leaves, 13 per cent. nitrogenous matter, 4 per cent. fatty matter, 60 per cent. extractive matter other than nitrogenous. Branches should be crushed and kept out of contact with air. " Leaf-fodder " is also used in Denmark.

With regard to acorns, horse-chestnuts and seeds of forest trees, the Ministerial Circular of July, 1917, to the French Prefects gives full information.

Acorns may be eaten by all animals as follows (if the amounts are exceeded enteritis and albuminaria may result) :—

	Fresh Acorns.	*Dry Acorns.*
Horses of 1,220 lb.	$8\frac{4}{5}$ lb.	$5\frac{3}{5}$ lb.
Bullocks 1,320 to 1,540 lb.	$13\frac{1}{5}$,,	$7\frac{2}{5}$,,
Milch cows 1,220 to 1,320 lb.	$8\frac{4}{5}$,,	$5\frac{1}{5}$,,
Sheep	$1\frac{4}{5}$,,	1·1 ,,
Pigs	$3–3\frac{1}{4}$,,	$1\frac{1}{4}–2\frac{1}{4}$,,

For horses 7 pints acorns are equal to $5\frac{1}{4}$ pints of oats. Acorn feeding should be suspended for a week after a month's continuous use. Horses and cattle should have raw acorns crushed and the husks removed. For pigs the acorns should be crushed into a coarse meal and mixed with cooked potatoes, or cooked with potatoes.

Horse-chestnuts.—For sheep especially 1 lb. to replace 3 lb. fodder beet. The maximum ration should be 2 lb. Cattle may receive 4–6 lb. for fattening purposes. The chestnuts should be cooked or cut up and well mixed with other food. Pigs refuse them in all forms, and they are poisonous to poultry, ducks and game.

In August, 1917, it was announced that a Danish company was being started to make the seeds of all wild trees—beech-mast, maple seed, acorns, etc.—into an oil-cake, but no further information has been obtained.

In Austria all horse-chestnuts and acorns were requisitioned in September, 1917. In Norway farmers were advised last February to use them. Beech-nuts are certainly collected in Germany ; but horse-chestnuts and acorns are needed for coffee substitutes.

Potato-tops were recommended in Norway last September to be used mixed with other fodder because of the large proportion of ash. The analysis is given as water 15 per cent., ash 16·4 per cent., fat 2·7 per cent., protein 14·8 per cent., non-nitrogenous extract 31·9 per cent., vegetable fibre 18·2 per cent. (this is doubtless the dried tops).

In Germany the *beet-root leaves* at the sugar factories are dried, giving a yield of 1 cwt. dry for 5 cwt. wet ; and other root-crop leaves are similarly dried with a yield of 1 cwt. for 10.

Hazel-catkins are being used in Germany as a substitute for bran. Directions were issued in January, 1918, that they should be collected in March before the blossoms burst out, well dried on the top of stoves or ovens, and milled or pounded into flour. The flour should be given dry, or sprinkled on rough fodder with some salt, not put into drinking water. Small quantities should be given at first to prevent indigestion ; the maximum amount should not exceed $4\frac{1}{2}$ lb. daily. Birch, alder, or beech catkins may be tried.

Considerable attention is being paid to *Pine and Fir Needles* in Sweden, since analyses show that protein, starch, dextrin and sugar are present in considerable quantities, although the cellulose content is 20 per cent. It is, however, necessary to get rid of the resin, turpen-

tine and etheric oils, which appear in analyses as crude fat. The scientific authority who made the analysis in Sweden has discussed the use of the needles in bread making, but the Government announces the creation of a factory for "pine and fir needle fodder" only.

In Germany the encouragement and cultivation of the weeds comfrey and coltsfoot is recommended, and in Hungary stinging nettles were being employed in January last. (*National Food Journal*, 12th June, 1918).

Report of the Sub-Committee of the Committee on Production and Distribution of Milk.*

THE Sub-Committee of the Committee on Production and Distribution of Milk, appointed to consider the steps necessary for the control, collection, utilisation and distribution of milk sold wholesale, and the need for establishing new depots and the geographical allocation of such depots, has just issued its Report†. The Sub-Committee was appointed as a result of correspondence between Major Astor, the Chairman, and Lord Rhondda in February and March last respecting the probable shortage of milk during the winter months and the consequent need for rationing or the control of distribution. Evidence was taken from twenty-one witnesses.

Difficulties considered.—Special attention was called to the following difficulties :—

1. The wasteful competition in the collection and handling of milk by superfluous depots or factories situated in the same area.
2. The lack of equal distribution of dairy utensils.
3. The diversion from factories or depots of milk produced in the immediate neighbourhood.
4. The uneconomical diversion of milk from one geographical area to another.
5. The unequal supplies that reach various consuming areas in proportion to requirements.
6. The difficulty in suitably allocating the amounts of milk that are required (*a*) for the manufacture of milk products, (*b*) for human consumption.
7. The need for a proper organisation to balance supplies and to convert surplus milk into milk products.
8. The unnecessary amount of transportation that takes place by road and by rail in the collection and wholesale distribution.
9. The unnecessary waste of man-power, horse-power, etc., in retail distribution.
10. The fear that large organisations if uncontrolled will ultimately result in a single buyer in particular districts, which would have a prejudicial effect on production.
11. The fear that large combinations of traders if uncontrolled may result in single sellers in particular districts, and thereby place consumers in the hands of a monoply to the possible detriment of quality, price, hours of delivery, etc.

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* Summaries of the 1st and 2nd Interim Reports of the Committee were published in this *Journal*, July, 1917, p. 450, and January, 1918, p. 1138.
† (Cd. 9095), 1918.

12. The need for encouraging the production of cleaner and better milk, thereby (*a*) making a more wholesome supply and (*b*) preventing waste.
13. The damage to and loss of milk caused by (*a*) delays and unhygienic conditions on railways, (*b*) insufficient treatment prior to transit, such as lack of cooling, (*c*) unsatisfactory size and type of churn in common use, (*d*) churns not being locked or sealed throughout transit.
14. The fixing of a uniform maximum price removes incentive to the production of milk of high hygienic quality.

Scheme for Control of Milk Distribution in Great Britain.—The Sub-Committee recommends the following scheme for the control of the wholesale distribution of milk in Great Britain. All the Clauses in this scheme were agreed to without division with the exception of Clause 8. There was a lengthy discussion in regard to Clause 8, which subsequently led to a division, 10 members voting in its favour and five members against it.*

1. The objects to be aimed at are the maintenance of the milk supply, the economical handling of milk, its equitable distribution, and the full utilisation of surplus supplies for manufacturing purposes.

2. For the purposes of controlling the distribution of milk Great Britain should be divided into suitable areas.

3. Milk Superintendents should be appointed in each area to take charge of the local distribution of milk and to act under the instructions of the Central Authority in London, with a separate Advisory Committee for Scotland, meeting in Edinburgh, and under the Central Authority in London. They should have access to the statistics and information in the Live Stock Commissioner's possession.

4. A National Milk Clearing House should be set up in London which should control the wholesale milk trade of the country, and employ persons, firms or societies, who are licensed to deal in milk by wholesale as authorised wholesale milk agents, as far as is necessary.

5. The Clearing House should take over existing contracts between wholesalers and producers, but would interfere as little as possible with direct contracts between producers and retailers. Such contracts would, however, be subject to the supervision and the approval of the Milk Superintendent for the area in which the retailer may be situated.

6. All milk churns in the possession of wholesale dealers, other than retail delivery churns, would be taken over and become the property of the Clearing House.

* The Committee on Production and Distribution of Milk, on receiving the Report of its Sub-Committee, resolved that on the evidence before them they were not prepared to agree to the desirability of purchases recommended in paragraph 8.

They believed that before coming to any decision as to the desirability of such steps, more evidence is required both with regard to the financial terms and to the practical needs and effects of purchasing the entire wholesale milk trade of the country; at the same time, however, they recommended that immediate steps should be taken to determine the basis on which the interests concerned could be acquired should this be deemed advisable at any time by the Government.

7. Manufacturers whose primary business is the manufacture of milk products would be authorised to act as wholesale agents of the Clearing House, and would be required to manufacture dried milk, cheese or other products on account of and in accordance with the instructions of the Clearing House.

8. In the organisation of the wholesale trade during the War, the power of wholesale traders may be strengthened or in some cases disorganised for the period after the War. It is, therefore, recommended that in constituting traders' agents of the Ministry of Food, the Government should at once obtain an option to purchase the businesses of such traders at a fair valuation to be arrived at by negotiation or by arbitration as experience may show the ultimate necessity of the State becoming the sole wholesaler of milk, a development which this Committee considers to be desirable.

9. *It should be the policy of the Clearing House to* encourage producers to form themselves into co-operative associations for the purpose of improving the conditions of milk production and for the manufacture of cheese.

10. It is recognised that milk should be produced and supplied under improved conditions so that it may be more clean and wholesome when it reaches the consumer. Any improvements that can be effected, by grading or otherwise, should be made in such a way as to anticipate the lines of future requirements.

The Sub-Committee express the opinion that the most suitable locations for the establishment of new milk depots cannot be properly determined in the absence of knowledge that can only be obtained by the exercise of full control over the wholesale trade.

The Report is signed on behalf of the Committee by Mr. Wilfred Buckley, *Chairman*.

THE following Notice was issued on 2nd July, 1918, by the Food Production Department of the Board :—

County Marketing Schemes.

The County Marketing Schemes which are being set up on the initiative of the Food Production Department appear to be making very satisfactory progress.

The aim is primarily the organised marketing of surplus fruit and vegetables grown by small cultivators. Last year a certain amount of assistance was given to such cultivators by the Department acting in association with the Agricultural Organisation Society ; but only in four counties were there schemes in operation on a comprehensive scale. These counties were Worcestershire, Warwickshire, Carnarvon, and Shropshire.

During the past few months schemes have been taken up in a number of other counties, notably East Sussex, West Kent, Notts, Surrey, Pembroke, and Essex, and at the present time there are seventeen counties where, through *Marketing Executive Committees* formed by the Horticultural Sub-Committees, organisations have been created for the systematic collection and distribution of surplus produce. In most cases the scheme also provides for the preservation by canning, bottling, drying, etc., of perishable fruit and vegetables to be placed on the market at seasons of the year when fresh supplies are scarce.

In addition to these 17 counties, 14 other counties are prepared to register societies, 7 have made arrangements for marketing, but not as yet by registered societies, 4 have arranged for local markets, 4 others are considering preliminary organisation or deciding to join other counties on a federated scheme. There are 46 counties in England and Wales where systematised marketing is in full swing.

In the departmental suggestions for organisation, liberal allowance is made for the varying conditions existing in the different counties, all of which have to be taken into consideration in establishing suitable local depots. This elasticity of arrangement is appreciated and has been found to work excellently. For instance, in Bucks, Kent, Middlesex and parts of Sussex, the County Organisation consists chiefly of the establishment of stalls in the country markets and the bringing to these stalls of surpluses from the surrounding districts. This admittedly primitive method of handling a somewhat complex problem has proved extremely successful in a number of districts, notably East Grinstead, Chobham (Surrey), and Llanfairfechan.

In North Wales a federation of 6 counties has been arranged, which includes Anglesey, Denbigh, Flint, Carnarvon, Merioneth, and Montgomeryshire, with a Central Marketing Depot at Llandudno and sub-depots in each of the counties federated.

It is hoped that a very important part in the establishment of village depots will be played by women's institutes and similar bodies, which are expected to co-operate in the assembling and despatching of local surplus to the markets. Apart from the patriotic point of view, these schemes have a distinctly advantageous business side, as growers, large and small, market salesmen, small holders, farmers, allotment-holders and gardeners' societies have been called into conference with railway representatives upon the subject. Every county scheme has been started on co-operative lines wherever possible. The value of the shares having been made so low, in order to come within reach of the smallest holder, accounts for the readiness with which capital has been raised in many counties, and offers splendid evidence of local feeling on the matter.

Women's Work on the Land.

The Progress of Recruiting.—In the four weeks ending 7th June, 3,252 women were added to the Land Army—an advance of 324 on the figures of the previous four weeks. Since the recruiting campaign started at the end oe March, 28,393 recruits have enrolled in thf Land Army, and just over 25 per cent. of these have been finally selected.

The demand for field workers continues, and a growing supply is now available from the gang hostels. The demand for skilled milkers is also increasing. Reports from the various counties show that the need of village forewomen is great.

Women Flax Pullers—Two thousand women are being sent by the Women's National Land Service Corps to Somerset and Northamptonshire to pull flax, and a gang of 200 school girls from the secondary schools in Yorkshire will work in that county and be housed in the gang hostel at Ousefleet. Arrangements have been made whereby Irish women are interviewed by a Ministry of Labour Selection Committee in Ireland and imported into England for agricultural work. These women join the Land Army in the usual way, and when they

reach England are treated in all respects as ordinary recruits. Those enrolling at the present time are being sent direct to Ousefleet to work in connection with the flax harvest.

Girl Students Help Farmers.—Four seasonal gangs of part-time women have been organised in Oxfordshire, where last year the village women are reported to have saved the root crop in many districts from serious damage by weeds. The Business Girls' Gang around Oxford is working well, and it is hoped to establish a club in the city where the business girls who are assisting the farmers in their leisure may meet regularly. Meanwhile, the girl students at Culham Training College—the National Training College for School Mistresses—have undertaken to work on local farms in the afternoons, the head mistress having promised to give extra leave for this purpose. Twelve of the students were recently engaged hoeing land near Oxford.

Women Thatchers.—A most satisfactory report has been received by the Food Production Department as to the competitions recently held among the women and girls who have been taught thatching this year in Cornwall and Devon. "These 16 students," says the Cornish report, "should be of great service to the county." Other counties may be encouraged by the successful results in Cornwall and Devon to institute similar classes with a view to the coming harvest.

Notes on Allotments.

The Growth of Allotments.—Recently the Food Production Department asked the local authorities of England and Wales to make a return showing the total number of allotments prior to and since the outbreak of war. From the actual figures received, and other inquiries of the Department (concerning the increase of privately-owned allotments, including those provided by railway companies), it is estimated that there are now in this country upwards of 1,400,000 allotments. The pre-war figure was about 570,000 allotments and the number laid out since the commencement of war is approximately 830,000.

Few people realise the extraordinary increase in the number of allotments during the past three-and-a-half years. The following figures should give an approximate idea of the enormous expansion of the allotment movement. Returns obtained from 69 of the 81 county boroughs in England and Wales show that there were under 59,000 pre-war allotments in these areas; whereas at present there are over 222,000 allotments, representing an increase of about 280 per cent. 132 town councils reported just under 42,000 pre-war allotments; now there are nearly 97,000 allotments in their areas—an increase of upwards of 130 per cent. In 233 urban districts there were 42,000 pre-war allotments as compared with over 100,000 allotments now in cultivation—the latter figure representing an increase of about 140 per cent.

In December last the Food Production Department appointed certain inspectors to facilitate the obtaining of land by would-be allotment holders and generally to assist the progress of the allotment movement. In six months these inspectors visited over 400 local authorities and consulted with them as to the acquisition of land for allotments. As a result 8,550 additional acres have been laid out by local authorities, providing 127,000 additional allotments. Several thousand allotment plots have also been provided by private owners as the result of negotiations with the departmental inspectors. As an example of the useful

work done by the Food Production Department's officers, the case of a single large local authority may be quoted. In the first instance this authority proposed to provide only 16½ acres of land this year for the purpose of allotments. Arising out of the representations of the departmental inspectors, addition after addition was made to the proposed area ; and in the end the authority actually provided 249 acres, giving 7,470 allotments.

The grand total of allotments in England and Wales at present covers an area of about 200,000 acres. Taking this figure—and estimating that 50 per cent. of each allotment is planted with potatoes (a conservative estimate)—we have 100,000 acres of potatoes on our allotments. If these produce an average of 7 tons per acre (a moderate assumption for garden and allotment potato crops) this means that the allotment holders of England and Wales will grow this year 700,000 tons of the most essential war-time crop practically on the spot where this crop is to be consumed.

Next Year's Allotments.—Quite a number of local authorities are looking ahead and arranging for allotments to be laid out for cultivation next year. Amongst these are the local councils of Thrapston (Northants), which is arranging for 4¾ acres ; Handsworth (West Riding of Yorkshire), 6 acres ; and Shipley, 3 acres.

Allotments at Alexandra Park.—Fifteen acres of land at Wood Green are being laid out to provide 225 war-time allotments. This land adjoins the race track at Alexandra Park and is the property of the Alexandra Park Race Course Syndicate. The Syndicate has agreed to surrender the land for spade cultivation, and the Cadet Corps of the Women's Land Army will undertake the work after this year's hay crop has been harvested.

A Famous School-town and its Allotments.—Oundle, the little north Northamptonshire town where there is a famous school, is among the places that have done exceptionally well in the matter of allotments. Two hundred and fifty-seven householders are cultivating an aggregate of 33½ acres of land. In addition the boys at the school have 8½ acres of allotments, whilst even the inmates of the workhouse are doing their bit by growing foodstuffs on 2½ acres. Moreover, upwards of 50 per cent. of the 580 houses in the town have gardens attached to them, and these on the whole are being judiciously cultivated.

The Garden Fire.—The smother fire is a useful institution, which should be seen in more gardens and allotments. A well-made fire will smoulder for a considerable time, and on it all garden refuse may be deposited. Cabbage stumps, decayed leaves, weeds, finished and exhausted plants, potato haulms, etc., can by this means be thoroughly destroyed, and it is the best receptacle for all diseased and insect infested plants and leaves. The ashes from such a fire should be carefully saved, forming as they do a very valuable fertiliser to be scattered over the soil and forked or dug in.

Rotation of Crops.—Many hold the belief that the potato must or should be put into fresh ground each season, but this is not the case. Provided the soil is deeply worked and suitable enrichment is added, potatoes can be grown on the same site for an indefinite number of years. Change of seed should be obtained, however, from another district. The Brassicas differ from the potato inasmuch as for these one season at least, and two for preference, should elapse before a return to the same spot. This arrangement, unfortunately, is not always

possible in a small garden, and here deep trenching and the judicious use of lime must be resorted to.

Another subject which has no objection to remaining on the same site for a number of years is the onion, provided the ground is well enriched. Peas should always have a fresh place selected for them, wherever possible, each year, failing which deep trenching must be done.

Some of the other vegetables thrive well on the same site for a number of years, and of these the best known and most useful are leeks, shallots, artichokes (both globe and Jerusalem), horseradish and carrots.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1d. *each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1 ; 37, *Peter Street, Manchester ; and* 1, *St. Andrew's Crescent, Cardiff.*

THE following Circular Letter (No. C. L. 54/C. 1), dated 24th May, 1918, was addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Programme of the Food Production Campaign, 1918-19.

SIR,—1.—The Department have had under consideration the form of organisation which should be adopted for carrying out the Food Production Campaign next season. During the past 15 months the organisation had to be built up piecemeal in order to cope with the various duties which have from time to time been entrusted to the Committees. The result has been that there is lack of co-ordination between some branches of the work, and a divided control in certain matters which ought to be remedied.

2. It has, therefore, been decided to place in the hands of the Committees more complete control of the local organisation of the Tractor Scheme, so as to enable it to be worked jointly with the Horse Scheme, and also to ask the Committees to make certain changes in regard to their own organisation and staff, with the object of securing better co-ordination of the work generally as well as a greater measure of delegation to the Districts.

3. The detailed proposals with regard to the co-ordination of the Tractor and Horse Schemes are set out in the Memorandum (Enclosure No. 1) which accompanies this letter, but the general scheme of organisation which the Department propose is as follows :—

4. **County Organisation.**—*Chief Executive Officer.*—In the first place the Department consider that the time has come when each Agricultural Executive Committee should have one principal official who is in general charge of the whole of their work and who should be responsible to them for seeing that the work of the different branches is properly co-ordinated, and that the policy of the Department and of the Committee is carried into effect. This official should be called the Chief Executive Officer, and, in view of the importance of his duties, the Department are prepared to authorise payment up to £500 a year if necessary to secure the services of a suitable man. In some cases one of the existing officials may be fitted for this post, but this will not always be the case, and the Committees must not hesitate if necessary to select a man

from outside. Any appointments to this post will have to be submitted to and receive the approval of the Department. The Chief Executive Officer should be responsible to the Agricultural Executive Committee for the whole of the work carried out in the county except (1) the actual correspondence and minutes of the Committee for which the Secretary would be responsible, and (2) the financial business which would be undertaken by the Finance Officer. The duties of the latter officer are becoming increasingly important, and the Department are prepared to consider proposals for the payment of an adequate salary for the post. In those counties where the County Accountant has been good enough to undertake the charge of the Committee's finance an allowance might be made to him or to some member of his staff.

5. *Sub-Committees.*—It is proposed that in all counties the principal work of the Agricultural Executive Committees should be undertaken by five main sub-committees, as follows :—

(1) Cultivation Committee, (2) Labour Committee, (3) Supplies Committee, (4) Horticultural Committee, (5) Finance Committee.

6. The work of the Labour, Supplies, Horticultural and Finance Committees will remain as heretofore. The Cultivation Committee, however, should be a new Committee charged, not only with the duties of controlling the Horse and Tractor Schemes, but also with the survey, the recommendation of cultivation orders and the general supervision of farming in the county. In those matters where action under the Defence of the Realm Regulations is required, the recommendations of the Cultivation Committee should be submitted for the approval of the Executive Committee. The Cultivation Committee will, therefore, take over all the duties of the Machinery Committee, which will cease to exist as such, such part of the duties of the Labour Committee as related to the administration of the Horse Scheme, and the duties the Survey or other Committee which has hitherto been responsible for the survey and the issue of cultivation orders.

7. In those counties in which steam-tackle is employed, a representative of the steam-tackle industry should be co-opted on to the Cultivation Committee so that he may attend all meetings at which matters affecting this industry are under consideration.

8. The Threshing Committee which has been constituted in most counties will act as a Sub-Committee of the Cultivation Committee.

9. *Staff.*—The Chief Executive Officer as stated above will be in charge of the staff, and he should attend the meetings of the Agricultural Executive Committee and of the principal Sub-Committees, and also supervise the outdoor work in the country. He will also be responsible to the Department for seeing that stock-records are efficiently kept in respect of all Government property placed at the disposal of the Committee. Under him there should be the following county officials each responsible for one branch of the work :—

(1) The Tractor Representative, who would undertake the general control of the tractors in the county and the supervision of the engineer contractors.

(2) The Horse Officer, who would undertake the general control of the horses and horse-drawn implements in the county, together with the supervision and care of the horses and the supply of forage.

(3) The Deputy Executive Officer, who would be the principal assistant of the Chief Executive Officer in regard to the survey, the

supervision and inspection of farms and the issue of cultivation notices. For this post the present Machinery Officers might in many counties be suitable.

(4) The Labour Officer, who would undertake the control and distribution of the soldier, prisoner and war agricultural volunteer labour placed at the disposal of the Committee, and the work in connection with the recruiting of labour from the land, including the issue of vouchers.

10. In most counties the Secretary of the Agricultural Executive Committee will, it is hoped, be able to act as Secretary to the Cultivation Committee also, but in cases where the Agricultural Executive Committee consider that this course would not be practicable the Department will be prepared to consider a proposal to appoint a special officer for this post at a salary not exceeding £200 a year.

11. The appointment of Tractor Representatives and Horse Officers will be subject to the approval of the Department, which will require to be informed of the qualifications of the candidates selected, and the amount of the salary proposed. For the present the post will be filled by the existing occupants, and, in view of the experience which they have acquired in carrying out their duties, the Director-General will not be prepared to sanction their removal within a period of six months from 1st July next unless the specific approval of the Department is obtained in each case.

12. **District Organisation.**—As the work of the Agricultural Executive Committees has developed it has become apparent that there must be a greater degree of decentralisation to District Committees. Some of the county officers have had far more work than they could do efficiently owing to the fact that the area they had to cover was far too large. It is, therefore, proposed that the local organisation should be brought down to the areas covered by the existing District Committees, and that there should be one paid whole-time official in each district responsible for all branches of the work of the Executive Committee. The proposed officer, who should be called the District Executive Officer, should be appointed by the Agricultural Executive Committee, subject to the approval of the Department, and might be paid a salary not exceeding £250 per annum.

13. The District Executive Officer would act generally as the agent of the Executive Committee for all purposes in the district, and his work would include any necessary inspections as well as the duty of controlling the work of the tractors and horses allocated to his district, supervising the labour employed and making contracts for cultivation. He should be responsible for the various branches of his work to the Chief Executive Officer of the county, the Tractor Representative, or the Horse Officer as the case may be. He should also work in close touch with the District Advisory Committee, but as it is essential that he should constantly be moving about his district, he must not be burdened with clerical work. It should be arranged, therefore, that all correspondence, the keeping of records and the minutes, etc., of the District Advisory Committees should be undertaken by the Secretaries of those Committees, and the Department are prepared to consider proposals for an increase in their remuneration where necessary. In many cases it should be possible to arrange that the services of the Supplies Clerks under the Tractor Scheme should be made available to assist in this clerical work.

14. *Commencement of Scheme.*—It is proposed that the scheme of re-organisation outlined above shall come into force on the 1st July, and the Department ask that in the first instance, and not later than the 15th June, a detailed scheme may be submitted to them, showing the manner in which it is proposed to apply to the county the principles embodied in this letter and the appointments which it is proposed to make.

15. A statement (Enclosure, No. 2) is enclosed * showing the staff which should be provided in each county, together with a list of the posts which should be abolished.

I am, etc.,
(Signed) A. LEE,
Director-General.

ENCLOSURE.

1. The main object which it is necessary to keep in view in co-ordinating the working of the Tractor and Horse Schemes is to make such arrangements as will facilitate :—

(*a*) The allocation of tractors or horses to the work for which they are best suited.
(*b*) The interchange of implements between the Tractor and Horse Schemes.
(*c*) The making of one contract with farmers for work to be done whether by tractors or horses.

2. In almost every county at the present time the local working of the two schemes is being carried out by entirely separate staffs, and the officers concerned with the Tractor Scheme are appointed directly by the Department. In future, however, the single staff provided for in the revised scheme of county organisation, all members of which will be under the control of the Agricultural Executive Committee, will be responsible for both Schemes.

3. The local area to be adopted for the purpose of the Schemes should be the area covered by the existing District Committee, and the working arrangements of both tractors and horses in it should be undertaken by the District Executive Officer, whose appointment and duties are dealt with in the covering letter. The present functions of the Tractor Supervisor and local Horse Officer will accordingly be transferred to him, and also the local duties of the Machinery Officer, and these three posts will be abolished. Owing to the new districts being in practically every case smaller than the area at present used for units of tractors, it will usually be possible for the whole of this work to be undertaken by the District Executive Officer. In special cases, however, where the amount of work necessitates such a course, an assistant could be appointed to the District Executive Officer, but this should not be necessary in districts of the average size (say 30 to 50 parishes).

4. The Department have at present for every unit of tractors a store for spare parts and fuel, and an office with a Supplies Clerk, who is a whole-time officer. It will be the duty of the District Executive Officer to arrange, wherever possible, for the Supplies Clerk to assist the Secretary of the District Committee with all the clerical work which has to be undertaken in the district, such as recording cultivation

* Not here printed.

orders and contracts, transmitting the acknowledgment of work carried out to the Finance Officer, keeping a register of the implements allocated to the district.

5. The District Executive Officer will also be responsible for making local arrangements for taking out the supplies of fuel, harness, fodder, etc., which is now generally done personally by the Tractor Supervisors or the Horse Officers. The cars used hitherto by Tractor Supervisors should be handed over for the use of the District Executive Officers.

6. In order that the Department may be in a position to supply Parliament and the Government with full information as to the working of the Horse and Tractor Schemes, and also maintain supervision over the consumption of fuel and the general cost of the Schemes, it is essential that any returns shall be furnished that the Department require. Pending further directions on this point the Cultivation Committee will be responsible for seeing that the weekly and other returns now supplied by Tractor Representatives and Supervisors continue to be furnished regularly and without delay. The Department must also continue to send its expert officers to inspect and report upon the condition and working of the Government horses, machinery and implements in the different counties. By this means it is hoped to place at the disposal of the Cultivation Committee and its officers special technical knowledge which will assist them in operating the machinery and implements to the best national advantage.

7. The Department will issue a further communication with regard to the transfer to Executive Committees of the responsibility for the local expenditure under the Tractor Scheme, which hitherto has been undertaken by the Department itself.

THE following Memorandum (No. C. L. 36/H), dated 5th July, 1918, has been addressed to Horticultural Sub-Committees by the Food Production Department of the Board :—

Scheme for Rabbit Breeding and Keeping.* At the instance of the Food Production Department, some of the leading rabbit-breeders and keepers throughout the country have formed an association registered under the title of the National Utility Rabbit Association. The Association is established in premises at the Model Farm, Neasden, London, N.W., where it has formed a Central Breeding Station and Stud Exchange, stocked with rabbits or the best breeds.

1. **Objects of the National Utility Rabbit Association.**—The primary object of the Association is to build up as quickly as possible a large stock of the best utility rabbits. The rabbits from the Central Station will be sold at the lowest possible prices to district breeding-stations to be set up in different parts of the country. The district stations will in turn supply, at lowest possible prices, breeding-stock to smaller stations in villages and towns. The ultimate object of the Association is to provide, through these stations, rabbits for keeping by private persons in town and country and thereby to increase largely during the next twelve months the supply of rabbits for food purposes.

*See also this Journal, June, 1916, p. 340.

Each district breeding-station will be a 100-doe centre, and will be kept by a person who already has 50 rabbits and who is willing to keep at least 100 breeding does. The smaller breeding-stations will be 20-doe centres and will be kept by persons who undertake to maintain a stock of at least 20 breeding does.

The Department understand that already 200 persons have expressed their willingness to establish a 100-doe centre.

2. **Advantages of Membership of, and Affiliation to, the Association :—**

(i.) Purchase of rabbits through the Association at lowest possible prices.

(ii.) Advice in procuring accessories and foodstuffs necessary for the keeping of rabbits.

(iii.) A share in the work of the Association in promoting work of national utility.

(iv.) Expert advice on all matters relating to the keeping of rabbits.

3. *County Organisation.*—It is suggested that the County Horticultural Sub-Committee should take the initiative in organising the county scheme, and the following proposals as to method are put forward by the Department with the object of assisting the Committee and ensuring a measure of uniformity in each county :—

District Breeding Stations.—At the request of the Department the National Utility Rabbit Association is preparing a list of persons in each county prepared to establish forthwith district breeding-stations (100-doe centres).

The duties of the Superintendent of the 100-doe centre will be :—

(*a*) To maintain not less than 100 breeding does and the necessary number of bucks.

(*b*) To sell at agreed prices to the Central Breeding Station or any other breeding centre affiliated to the Association a portion of his stock suitable for breeding.

In the case of pedigree stock the proportion available must vary from time to time, and the exact proportion to be disposed of must be a matter of conference between the Secretary of the Association and the owner of the station.

(*c*) To maintain the stud bucks supplied to him from the Central Breeding Station for the use of the breeding-centres in his district.

(*d*) Generally to assist the rabbit clubs in his district.

(*e*) Each centre shall be self supporting.

Generally speaking it will be found that one district breeding-station will supply two or three Rural Districts, but that one station or even more will be required in each Urban District.

The Horticultural Sub-Committee will probably desire to delegate the organisation of rabbit-keeping in the neighbourhood of district breeding stations to its local (District or other) Committee. Committees which adopt this course will probably find it convenient to elect the keeper of the District station as a member of their Committee.

The Department consider that the best way in which the Horticultural Sub-Committee can assist the Association will be to secure as soon as possible, through their District and Village Committees, the formation of rabbit clubs in every village and small town in the county.

4. **Rabbit Clubs.**—Wherever a number of persons desire to keep rabbits co-operatively, they should form a rabbit club and either establish a 20-doe centre or become associated with such a centre already established in their immediate neighbourhood. All these clubs should affiliate with the National Utility Rabbit Association. The fee for such affiliation for a club of 20 members or any fraction thereof is 5*s* per annum. Clubs of more than 20 members shall pay a fee of 5*s*. per annum for every 20 members or part thereof, *i.e.*, a club of 55 members will pay a fee of 15*s*. per annum. In addition, clubs may purchase shares at the rate of £1 per share. The affiliation fee carries with it the right to enjoy the privileges attaching to affiliation with the Association which are set out in paragraph 2.

Any person desirous of becoming a Vice-President of the Association may do so on payment of £10 10*s*. or a Life member on payment of £5 5*s*. Anyone joining the Association as a member, Vice-President or Life member will be entitled to purchase stock for breeding, together with such material as he may require, direct from the Central Breeding Station.

Some time must elapse before keepers of 20-doe centres are in a position to provide rabbits required for keeping by members of their club, but during this period, and subsequently when necessary, they will be entitled to apply to the 100-doe centre or the Central Breeding Station for a fair allocation of stock for this purpose. Similarly, a 100-doe centre short of stock will be supplied direct from the Central Breeding Station in London, which will supply all the stock that may be required. It is important that all rabbit clubs, both those already in existence and those to be formed, should affiliate with the National Utility Rabbit Association so that rabbit-breeding may be developed on national lines.

5. **Rabbit Club Rules.**—Each rabbit club should be properly constituted with a Secretary and Treasurer and should have properly drawn-up rules. A draft set of rules is enclosed herewith* and copies will be sent from the Department for distribution to the subsidiary organisations of the Horticultural Sub-Committee. These are model rules, and are only meant to serve as a guide. New clubs may prefer to alter them to suit local requirements, but uniformity is very desirable.

6. **Prices of Rabbits.**—The National Utility Rabbit Association has been registered under the Industrial and Provident Societies Acts, 1893 to 1913, and trading transactions which it carries on are undertaken in the interests of members and affiliated societies, and not with the object of making profit. The policy of the Association with regard to prices is to bring the utility rabbit within the reach of every cottager and allotment holder, but it must be remembred that the prices of the finest pedigree stock, as distinguished from the utility stock, must always be higher. The Association will fix a list of prices of utility rabbits to be supplied from the Central Breeding Station to the 100-doe centres; these prices will also rule for utility rabbits supplied from the 100-doe centres to the 20-doe centres.

7. **General Information.**—All associations should apply to the Food Production Department for pamphlets and leaflets on rabbit-keeping and breeding.

THE following Memorandum (No. C. L. 103/12), dated 5th July, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Labour for the Harvest. The sources of additional labour for harvest work are as follows :—

Prisoners of War.—All Committees have already been informed of the number of prisoners who can be placed temporarily at their disposal in migratory gangs, to work in the harvest, in addition to the prisoners of war already on agricultural work in the county.

Convalescent Soldiers.—An Army Council Instruction will be issued in the course of a few days, authorising the employment of suitable convalescent soldiers on harvest work on condition that they return to hospital each night, or once every three days for medical examination. Copies of this Instruction will be sent to all Committees, and also a list of the hospitals in their area. On receipt of this list Committees should communicate with the Commandant of the Hospital, with a view to ascertaining how many men are likely to be available from each hospital. It will be advisable for Committees to appoint local representatives in each case to organise and distribute the men available.

A small number of soldiers from Command Depots will also be available for harvest work on a month's agricultural furlough.

Public and Secondary Schoolboys.—Many thousands of these boys are available, and doubtless all Committees desiring their services have already arranged with the Ministry of National Service for the formation of camps in districts where much extra harvest labour will be required.

Women.—A large number of women are available, and Committees should arrange for their distribution in consultation with the Women's War Agricultural Committee for the county.

Royal Air Force.—The Air Board has given instructions that men are to be encouraged to volunteer for harvest work in the neighbourhood of their camps when they can be spared from their ordinary duties. Commandants of Royal Air Force stations, aerodromes, etc., should be asked how many men are likely to be available.

War Agricultural Volunteers.—Every effort should be made to enrol every suitable man under the War Agricultural Volunteer scheme. The enrolment of these men will make additional men available for harvest, but, of course, no man who is not suitable to be employed as a permanent farm worker can be enrolled.

Local Authority Employees and Police.—A copy of a Circular Letter issued by the Ministry of National Service to all county clerks, town clerks, and chief constables, is enclosed* for the information of Agricultural Executive Committees. Committees will observe that special facilities are granted in order that Local Authority employees and policemen may undertake harvest work, and they should communicate with the local bodies in their area with a view to obtaining the assistance of as many of these men as can possibly be spared.

Part-Time Labour.—Steps must be taken to organise all part-time labour that is available. In many districts there are already Part-time Committees, under the Ministry of National Service, who are assisting with farm work. In other districts Committees might appoint a local representative to organise all part-time labour and place it with farmers. In some counties it has already been arranged for the

whole of the roadmen to be made available, and quarry owners in some cases are releasing a large number of men. Employers of labour in the county should be approached with a view to giving assistance to farmers in the neighbourhood during the busy time of the harvest.

After ascertaining the supplies of labour that will be forthcoming from the above sources, and consulting the district committees as to the amount of labour that will be required to get in the harvest, Agricultural Executive Committees should inform the Department if they are of opinion that it will be essential to provide additional whole-time labour. The number of additional men who will be wanted should be stated, and the date on which they will be required. The Department are, of course, unable to guarantee that these additional numbers can be provided.

THE following Appeal was addressed to the women of Great Britain by the Prime Minister on 26th June :—

Labour for the Land: Premier's Appeal to the Women of Great Britain.

"The fields are ripening for the sickle; the toil of the winter and the spring is earning its reward. This is no ordinary harvest; in it is centred the hope and the faith of our soldiers that their own heroic struggle will not be in vain.

In the days before the War the whole world was our granary. Now, not only are thousands of men fighting instead of tilling our own fields, but the German submarines are trying to starve us by sinking the ships which used to carry to our shores the abundant harvests of other lands.

Women have already served the Allies by their splendid work upon the farms, but the Army in France has asked for still more men from the land to come and help their brothers in the desperate battle for Freedom. These men must go; women will be first to say it. But the harvest is in danger for want of the work these very men would have done.

Once again, therefore, as often before, I appeal to women to come forward and help. They have never failed their country yet; they will not fail her at this grave hour. There is not a moment to lose.

Every woman who has the great gifts of youth and strength, if not already devoting these to essential work for her country should resolve to do so to-day. If she lives in a village let her go out and work in the fields from her home. If she can give her whole time, let her join the ranks of the Land Army. From the nearest Employment Exchange she can learn all about the conditions of service.

I have watched with deep interest and admiration the splendid work already done. Never have British women and girls shown more capacity or more pluck. And just as the soldiers have asked for thousands more men to come and help

them to win the War, so do these brave women in the villages and in the Land Army call to other women to come and help them save the harvest.

I know this appeal will be heard. Ask the women who have already shown the way, what they feel; they will declare that work in the fair fields of our green Island is a privilege as well as a duty."

(Signed) D. LLOYD GEORGE.

THE following information has been issued by the Ministry of National Service:—

War Agricultural Volunteers.

General.—War Agricultural Volunteers are men who enter into an agreement with the Minister of National Service to undertake agricultural work to which they may be assigned by the Minister during the War for a period not exceeding 12 months in all.

No man will be enrolled as a War Agricultural Volunteer until he has actually been accepted by an employer as suitable for an actual vacancy; and if the vacancy has been "approved" by the relative Agricultural Executive Committee. Vacancies for "seasonal workers" will not be so approved.

Men will be enrolled as War Agricultural Volunteers either through the agency of an Employment Exchange or through the Agricultural Executive Committees. They will be enrolled either for general work, *i.e.*, for work anywhere in England or Wales, or for local work, *i.e.*, work within daily reach of the Volunteer's home. The terms of the undertaking signed by War Agricultural Volunteers are set out respectively on the next page. The undertaking in each case entitles a Volunteer to the current rate of wages for the job on which he will be employed, and also to certain allowances in respect of travelling or subsistence, and, further, to certain "out-of-work" allowances. *The allowances (except out-of-work allowances) will be paid to the Volunteer by the Agricultural Executive Committee and recovered by them from the Ministry of National Service. "Out-of-work" allowances will not be payable by the Committee, but by the Ministry of National Service through the Employment Exchanges.*

If any Volunteer who is directed by the Ministry to work with an employer presents himself for work and is not immediately started, it will be necessary for the employer to pay him for any time lost. Such payments are not recoverable from the Ministry.

Position with Regard to Military Service.—No man who has not attained the age of 45 at the date of his application for enrolment will be enrolled as a War Agricultural Volunteer unless he proves that he is in Medical Categories B3 or C3 or in Grade 3. Any man, however, who had attained the age of 45 on that date will be eligible for enrolment.

Whilst enrolment as a War Agricultural Volunteer does not in itself afford protection from Military Service, the Ministry of National Service have arranged *that so long as a man continues to be engaged in employment as a War Agricultural Volunteer* he will, for the present, on application, be protected from liability to be called up for Military Service:—

(*a*) Without regard to his medical category if he had attained the age of 45 at the date of his application for enrolment;

(b) Provided that he proves to be in Medical Categories B3 or C3 or in Grade 3 if he had not attained the age of 45 at the date of his application for enrolment.

War Agricultural Volunteers will be given, upon enrolment, a form upon which they can claim the protection referred to above. This form will be taken by the Volunteer to his employer and, after being countersigned by the employer, should be sent or handed to the Assistant Director of National Service of the district in which the man is employed.

Note.—Further information may be obtained on application to County Agricultural Executive Committees, at offices of County Councils, or from the nearest Employment Exchange.

TERMS OF AGREEMENT.

WAR AGRICULTURAL VOLUNTEERS.

I hereby agree with the Minister of National Service to undertake agricultural work :—

(*) (a) Generally, upon such farms as may be named by him ;

(*) (b) Locally, upon such farms as may be named by him ;

and to remain at such work upon the conditions set out on this form during the War for as long as required by the Minister not exceeding twelve months in all.

(a) That is, anywhere in England or Wales.

(b) That is, within daily reach of his home.

(*) Strike out the line which does *not* apply.

The conditions are as follows :—

1. The rate of my wages, while I am engaged upon such work, shall be the rate current for the job upon which I shall be employed.

2. I shall receive over and above my wages, the following allowances :—

(i.) *Travelling* :—

(a) If the farm is at a distance beyond that which, in the opinion of the Minister, I can reasonably travel daily from my home, a free railway warrant at the commencement and completion of the work which I am directed to take up ; or

(b) If the farm is within daily travelling distance from my home, the daily cost, if any, of a workman's return ticket by railway.

(ii.) *Subsistence* :—

If the work is at a distance beyond that which, in the opinion of the Minister, I can reasonably travel daily from my home, subsistence allowance, if necessary, whilst I am working at such work at the following rates :—

(a) If married, or if unmarried, and my home is mainly dependent on me, 2*s*. 6*d*. per day for seven days per week ;

(b) If unmarried, and my home is partially dependent upon me, 1*s*. 6*d*. per day for seven days per week ;

if I show to the satisfaction of the Minister that I have dependents for whose maintenance I am responsible and from whom I am obliged to be separated owing to my being at such work.

3. The allowances which I am to receive under this agreement other than those specified at 2 (i.) (a) above and 4 below, are to be paid to me by the Agricultural Executive Committee.

4. *Out-of-Work Allowances.*—If, after being placed in employment by the Minister of National Service, my employment, owing to no fault of my own, comes to an end during the War, and no further work is available for me, I may be entitled to receive, whilst no work is available for me, an Out-of-Work Allowance at the rate of 3*s*. 6*d*. per day (including Sunday), for any remaining portion of a period of six months, which period shall commence on the date on which I am first placed in employment by the Minister of National Service. The first payment of such Out-of-Work Allowance shall be due one week after the commencement of unemployment.

5. I shall be subject to the ordinary working conditions attaching to the employment in which I am directed to work by the Minister.

6. Any question which arises as to the interpretation of the foregoing provisions shall be determined by the Minister of National Service.

THE following Notice was issued on 19th June, 1918, by the Food Production Department of the Board :—

Scheme for the Employment of Prisoners of War to Assist in the Hay and Corn Harvests.

1. In the neighbourhood of agricultural camps, parent camps, etc., prisoners will be available in the ordinary way for employment on harvest work. All prisoners in agricultural camps and at least 50 per cent. of the prisoners employed on land reclamation work should be made available for harvest work, and those surplus to the requirements of the neighbourhood should be sent out in migratory gangs as in paragraph 2. Government Departments employing German prisoners are being approached with a view to as many as possible of the prisoners they employ being released for harvest work. So far as possible such prisoners should be employed in the neighbourhood of their working camps, but any balance will be available for employment in migratory gangs.

Migratory Gangs.—2. Each gang will consist of 10 prisoners and 2 guards and be available to meet the requirements of those districts which are not served by any existing prisoner-of-war working camp. The prisoners for these gangs will be supplied from the sources mentioned in paragraph 1, as well as from prisoners temporarily placed at the disposal of the Agricultural Executive Committee by the War Office for this purpose, and sent direct from parent camps.

3. The Agricultural Executive Committee should report to the Department at once the number of migratory gangs which it expects to provide from agricultural and land reclamation camps, and how many additional prisoners they require for additional gangs during harvest.

4. The Committee must decide where each migratory gang is to be located for harvest work. In this connection it should be noted that :—

(*a*) Migratory gangs must not be worked within five miles of the coast without the express sanction of the Area Commandant or in the vicinity of an aerodrome, munition works, or any other important military or naval station.

(*b*) Prisoners must not be worked in a neighbourhood served by a schoolboy camp or women's agricultural camp.

5. The Committee will select and secure accommodation for each gang consisting of not more than 12 (10 prisoners and 2 guards) in a lock-up building, centrally situated and suitable for accommodating the whole of the gang at a fixed price of 3*d*. per head per night (to include a sufficient supply of good water). Where such accommodation cannot be secured a suitable site for the erection of one or two tents must be procured at a cost not exceeding 1*d*. per head per night (to include a sufficient supply of good water). Payment for the accommodation at the prices fixed must be made by the Committee out of the monies provided for in paragraph 17. Where gangs greater than 12 are required the local Quartering Committeee must be consulted as to their housing.

6. The Commandant of prisoners of war for the area must be notified of the arrangements made for accommodating migratory gangs at least 14 days before the date on which it is desired that the camp should be opened. Any subsequent change in the location of a camp will be a matter of arrangement between the Commandant and the Committee. This will enable prisoners to be moved to a new district at short notice.

7. In arranging the places to which migratory gangs should first be sent in accordance with paragraph 4, the map should be studied with a view to an equitable distribution, bearing in mind the position of existing camps. The Committee should assign a serial number to each migratory gang, and send a list showing the number and place selected for each gang to the Commandant. The serial numbers should be used *in all correspondence, records, and accounts.*

8. The Military Authorities will supply the necessary tents and stoves, and the prisoners will be provided with palliasses, blankets, mess-tins and cooking utensils.

9. The Committee must appoint a local representative, who should either be a member of the Committee's existing staff or a non-salaried representative for each migratory camp, who will be responsible for allocating the prisoners locally amongst the farmers requiring them for harvest work, or, if such work is delayed or stopped owing to bad weather, for any other work of a useful character. He will also deal with any minor complaints, and if the Committee so desire he will collect on their behalf the sums due for the employment of the prisoners.

10. The following charges for prisoner labour have been fixed:—

(*a*) Whilst employed on hay harvesting.	4*s*. 6*d*. per day of 10 hours (excluding meal times).
(*b*) Whilst employed on corn or potato harvesting.	5*s*. 6*d*. to 6*s*. 6*d*. per day of 10 hours (excluding meal times).
(*c*) Whilst employed on ordinary agricultural work owing to harvest work being stopped in the locality.	The existing rate of pay for prisoners employed on agricultural work in the county, less one halfpenny per hour to meet part of the cost incurred by the farmer in providing the mid-day meal and refreshments.

When employed on haysel or corn harvest overtime to be charged at 8d. per hour.

The Agricultural Executive Committee will be responsible for the collection of these charges.

In addition each farmer will be required to provide, at his own expense, a suitable mid-day meal for the prisoners he employs. Tea, coffee, cocoa, or milk may be given, but not intoxicants.

No farmer or other person may give money to a prisoner of war, otherwise he will be guilty of a breach of the Defence of the Realm Regulations.

11. Except as stated above rations for the prisoners and guard will be supplied by the Military Authorities.

12. The Guard will keep in duplicate a record showing by whom each prisoner is employed each day, the nature of the work done, hours of overtime worked, etc. One copy of this is to be sent each Saturday to the Commandant, and the other to the local representative of the Agricultural Executive Committee, who will examine it and send it to the Committee with the amounts collected from the employers if the duty of collection has been assigned by the Committee to the local representative.

13. Each gang will be nominally attached to a prisoners of war camp in the county, and the officer in charge will pay periodical visits to see that the prisoners and guards are properly accommodated, and will be responsible for the feeding and general discipline of the gang, payment of guard, etc.

The Agricultural Executive Committee should arrange for a motor conveyance, preferably one of the Ford cars (with van attachment),

to be made available for taking this officer to inspect these migratory camps, as it is important that strict discipline should be maintained.

14. The guard will not be required to undertake agricultural work, but if, with the consent of the Officer Commanding, any such work is undertaken, the rate of pay must be the subject of mutual arrangement between the guard aud the employer.

15. Farmers employing prisoners will be responsible for their safe custody from the time of their leaving the camp in the morning until their return at night. Prisoners must be returned and handed over to the guard at night not later than half-an-hour after sunset.

16. The Committee must arrange for the conveyance of the equipment of the prisoners and their guard to and from the nearest station, etc., as well as in connection with any intermediate movements of the camp during the harvest period. The cost of such conveyance must be paid for by the Committee out of the monies provided for in paragraph 17. Lorries and teams in the possession of the Committee should be used for the purpose if in the vicinity.

17. As stated in paragraph 10, the Agricultural Executive Committee will be responsible for the collection of the sums due from employers for the services of migratory gangs. These amounts should be collected each week either by the District Representative responsible for each camp and forwarded by him to the Finance Officer of the Committee, or in such other manner as the Committee may determine.

The Committee must keep a separate account in respect of each prisoner of war command to which gangs are attached, and render an account and pay over monies to the Commandants concerned at the end of each month, *after deducting the following items* :—

(*a*) The sums paid for the accommodation of prisoners and guard in accordance with paragraph 5 ; and

(*b*) The sum of 1*s*. in the £ on the full amount received for the prisoners' work.

The amount produced by the latter deduction is intended to meet the costs to which the Committee will be put in connection with the scheme, in addition to the expense of providing accommodation.

18. An account of the receipts and payments on the scheme as a whole should also be included in summary form in the quarterly accounts rendered by the Committee to the Food Production Department, the relative service account being entitular the "Prisoners (Migratory Gangs) Employment Account." The sums retained under paragraph 17 (*b*) should be transferred periodically to the Committees' Administration Account.

19. The Committee should appoint a representative to be responsible for the supervision of the scheme throughout the county, working in close touch with the Military Authorities.

THE following Notice was issued towards the end of June by the Food Production Department of the Board :—

Government Tractor Competitions: Fine Work by Wounded Soldiers.

The awards in the Gordon Selfridge Tractor Prize Competition (open to all Government-owned tractors in England and Wales) have been made this week. Twelve prizes were offered by Mr. Selfridge for competition among

for the best acreage achieved, and the first and second prizes for the lowest fuel consumption, were offered for each of three different periods—one period of three months, one of two months, and one of one month, both the shorter periods being included in the longest period.

It is interesting to note that no fewer than 20 out of the 24 men sharing in the prizes are soldiers.

The Highest Acreage.—The Holland Division of Lincolnshire carries off chief honours in the competition, winning 3 out of the 12 prizes; one first for acreage and one first and one second for low fuel consumption. The first prize for the highest acreage achieved for the 3-months period was won by Titan tractor No. 2736, with the highly creditable score of 354¼ acres. The men operating the tractor were both soldiers. Pte. W. Drewett is a native of Hastings (East Sussex), where, previous to the War, he drove a motor-bus. Pte. R. Beard, his mate, is also a Southerner, coming from St. Mary Cray (Kent). In years gone by he had worked as a farm hand; but he had been driving a motor-van for some time when war broke out. During the competition, when light permitted, they worked 98 hours a week. All the ploughing was done with a self-lifting plough. Thus Drewett and Beard were able to take turn and turn about at starting and stopping work early; and, by having their meals at different times, they kept the tractor working continuously during the daylight. Only one serious breakdown occurred; this entailed a delay of five hours for repairs.

The Lowest Fuel Consumption.—The first and second prizes for low fuel consumption in the two-months period were won by two Fordson tractors, both manned by soldiers. The first prize-winner is Tractor No. 70, the consumption of which worked out at 2·13 gal. to the acre. "My mate, Dorsay, used to laugh and say 'we should squeeze the tins,'" said Pte. J. E. Kirkbright, referring to the thoroughness with which they drained every can of fuel.

Kirkbright, who hails from Durham county, was managing a large hosier's shop in Stockton-on-Tees before he donned khaki. Prizes seem to come his way naturally; for he had won two first prizes for window dressing in more peaceful days. His mate, Pte. T. Dorsay, showed great pluck by carrying on when he was really too ill for work. He suffered from an old wound and the after-effects of being gassed; but he made light of his ailments till the end of the competition, when he promptly collapsed and is now in hospital.

The second prize-winner, Tractor No. 71, had a fuel consumption of 2·26 gal. to the acre. Pte. W. A. Ephgraves, whose home is Reading (Berkshire), is another warrior incapacitated by wounds from further active service. Some years before the War he was well known to the football public as one of the Crystal Palace eleven. A broken leg ended his career as a footballer, but did not prevent him fighting the Hun. His mate was Pte. C. Hendrick (a fork grinder of Sheffield).

Norfolk carries off second honours, with two fuel-consumption prizes; the first prize for the three-months period being won by L.-Cpl. H. Bissett and L.-Cpl. J. S. Kiddy with Fordson tractor No. 563, and a consumption of 2·49 gal. to the acre. The second prize for the period of one month was secured by Fordson Tractor No. 313, with a consumption of 1·82 gal. per acre, Pte. J. H. Kemp and L.-Cpl. J. A.

The other prize-winning tractors with their teams are as follows :—

Second fuel-consumption prize for the period of three months, Wiltshire ; Parrett tractor No. 5025, Ptes. E. A. Kintey and A. Hawkins, consumption 2·6 gal. per acre.

First fuel-consumption prize for the period of one month, Cumberland ; Burford-Cleveland tractor No. 5437, Sgt. P. J. Perry and Pte. Murray, consumption 1·49 gal. per acre.

Second prize for acreage for the three-months period, Oxfordshire ; Titan tractor No. 4122, Gunner Carter and Pte. Dale, 265½ acres.

First prize for acreage for the period of two months, Herefordshire ; Overtime tractor No. 5677, W. Powell and J. Wall, 257¾ acres.

Second prize for acreage for the period of two months, Worcestershire ; Titan tractor No. 3501, Ptes. S. H. Soden and A. Clegg, 191½ acres.

First acreage prize for the period of one month, Somerset ; Fordson tractor No. 319, G. Parsons and P. Pemble, 94 acres.

Second prize for acreage for the period of one month, Yorkshire (West Riding) ; Fordson tractor No. 139, Air Mechanic T. Mottram and Pte. A. V. Clarke, agreage 87½.

THE *following Letter (No. C. L. 199/M. 6), dated 17th June, 1918,* has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Petrol and Paraffin. SIR,

With reference to the Circular Letter on the above subject, reference 62/M. 1, of the 8th February last,* the Petroleum Executive have been considering the whole question, and have asked this Department to amend that Circular Letter.

It has been found in practice that certain types of agricultural tractors that were designed to run on petrol do not run economically, even with alterations, when they use paraffin, with the result that the actual quantity of fuel which has to be imported is increased, and the efficiency of the machines is diminished.

It has been decided, therefore, to amend that portion of the letter of 8th February which asks that petrol should not be used where paraffin can be substituted for privately-owned tractors.

In future, Agricultural Executive Committees should recommend the issue of petrol for food-production purposes wherever they are satisfied that it is more suitable to the machine than paraffin. If there is any doubt as to whether paraffin or petrol should be used, preference should be given to petrol.

Questions are constantly being asked as to whether private users of tractors can obtain paraffin at the same price as this Department does. This can only be done by a consumer entering into an arrangement with one of the large oil companies to supply him in bulk at wholesale prices. In this case he would have to provide storage facilities. The Department arranges to buy at the wholesale price ruling at the date of purchase in this manner, and it is open to any individual to make a similar arrangement. Each of the oil companies now serves a definite district through one of its branches, and arrangements can be made direct with the local branch.

Except for the alterations set out above, the arrangements outlined in Circular 62/M. 1 are still in force.

I am, etc.,
(Signed) HUGH M. STOBART,
Director, Requirements and Statistics.

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* Printed in this *Journal*, March, 1918, p. [illegible]

THE following Memorandum, dated 28th June, 1918, was issued to Agricultural Executive Committees by the Food Production Department of the Board :—

Private Gardeners Engaged in the Cultivation of Vegetables, etc., and Military Service.

The question as to the position of private gardeners who are engaged on work of food prodnction which may reasonably be considered to be of national importance has been under consideration. In dealing with such cases the following points should be considered by Agricultural Executive Committees.

It is of no importance whether a man was registered under the Registration Acts of 1917 and 1918 as a gardener or otherwise who was not at the time of registration occupied in food production The occupation on 28th May, 1918, is the ruling fact. The essential point to be considered is not the acreage under cultivation bnt the man's occupation, the value of that occupation to food production, and the volume of produce depending on the exercise of the occupation.

If the Committee is satisfied that a man is wholly or mainly engaged in the production of food of a kind and quantity to constitute national importance, they may issue a voucher under the Agricultural Exemptions Order, 1918, protecting him from military service.

It is also to be clearly understood that if a man has already been called up the calling up notice will not operate, and should be cancelled if an Agricultural Executive Committee decides that he is eligible for a voucher under the Order.

THE *following Notice was issued early in July by the Food* Prodnction Department of the Board :—

Cultivation of Rye as a Grain Crop.

In pre-war days the price of rye was so low owing to the demand for a purely white flour, which can only be made from wheat, that the area devoted to the crop was very small, and it was only grown as a grain crop on the poor, sandy soils where other cereals could not be relied on. Under present conditions it deserves to be grown much more extensively. It is a safe, hardy crop comparatively unaffected by drought, frost or insect pests, and on the soils to which it is suited it yields a greater weight of human food per acre than any other grain crop. From the farmer's point of view its present price, which is the same as that of wheat, makes it an attractive crop, and the fact that it can be sown early, between the hay and the corn harvests, provides a means of lessening the rush of work in spring and autumn.

Excellent crops of rye are to be seen this year after old grass or long leys, which were broken up last year immediately after the hay was cleared, and on thin, sandy or chalky soil this plan is to be commended. The alternatives are sowing with winter oats, which will not stand a severe winter, and sowing with spring corn, which is more liable to be affected by insect pests and by drought.

If the weather allows, and the necessary tackle and labour are available, the grass may be bastard-fallowed after sowing; but unless an effective fallow is likely to be obtained the better plan would be simply to plough and press, then sow immediately. Rye may be sown almost

by sowing early—August and early September—whereby the plant gets a good start and a firm hold of the ground before the winter sets in.

Rye should be sown in preference to wheat on land which for any reason has been summer-fallowed and is too light for the latter crop, and it is specially adapted for sowing as a second corn crop on poor, light soils ploughed out of old grass during the past season. With the exception of wheat, rye is the grain most suitable for milling purposes, and it is desirable that there should be a very large increase in the area devoted to it. The cultivation is simple and is described in a leaflet issued by the Board of Agriculture (Food Production Leaflet No. 10), which may be obtained free on application to 3, St. James's Square, London, S.W. 1.

THE following Notice was issued early in July, 1918, by the Food Production Department of the Board :—

The Cutting of Mixed Crops.

Inquiries received by the Food Production Department indicate that some doubt exists as to whether the Growing Grain Crops Order, 1918* (No. 402), which prohibits the feeding to cattle or the cutting before maturity of certain grain crops, is to be regarded as prohibiting the cutting of a mixed crop of oats and tares in a green state for feeding purposes. It is, however, to be noted that the crops referred to in the Order—wheat, oats, barley (except winter-sown barley), and dredge corn—are crops consisting entirely of grain ; and the prohibition was not intended to cover mixed crops containing, in addition to a grain a non-grain plant, grown *bonâ fide* for soiling, ensilage or similar purpose.

THE following Notice was issued by the Food Production Department of the Board in June :—

Broken-Up Grass Land.

A good deal of difference of opinion prevails amongst agriculturists as to the best time of year at which to break up grass land. It has been reported to the Food Production Department that an inquiry in Oxfordshire covering 85 cases (1,658 acres) of grass land broken up between 1st July, 1917, and 31st March, 1918, shows that failures occurred chiefly with land ploughed between November and March. Earlier ploughing gave consistently good results. The evidence suggests that generally if land is not ploughed before the hay crop is taken, it is very desirable to plough it immediately afterwards.

THE following Notice (No. C. L. 56/C.1), dated 24th May, 1918, was addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Crops Damaged by Insect Pests.

The Department have been asked whether farmers whose crops are destroyed by insect pests on land ploughed up in accordance with Orders served by Agricultural Executive Committees will receive compensation from the Defence of the Realm (Losses) Commission.

No claim for compensation in such circumstances has up to the present come before the Commission, but the Department have reason to think that the view of the Commission would be that damage to

crops by insect pests cannot be regarded as a direct loss due to the exercise of the powers of the Defence of the Realm Regulations such as would enable them to pay compensation, especially as damage of the kind has occurred on old arable as well as on newly-ploughed grass land, and in a great number of cases it might have been avoided if the land had been properly pressed and consolidated.

The Department cannot therefore encourage any hope that compensation will be paid by the Commission, but if there are any cases of special hardship where a farmer has suffered substantial loss, and the Committee are satisfied that he has taken all proper precautions, the Department are prepared to authorise Executive Committees in such cases to supply seed for resowing free of charge. Where farmers have already resown their land, Committees are authorised to reimburse the cost of the fresh seed if they are satisfied that the case is a proper one for such assistance. Any cases in which Committees take such action should be reported to the Department for record, with a statement of the area affected and the cost and kind of the seed supplied or paid for.

THE following Notice was issued by the Food Production Department of the Board towards the end of June :—

Insect Pests and Birds.

The opinion seems to be widely held that birds are the most important factor—if not the only factor—in keeping in check caterpillars and other insect pests, and this has led to the expression of exaggerated views on the importance of birds in preserving Nature's balance. It is worth pointing out, therefore, that insects are subject to the attacks of many enemies besides birds—as, for instance, parasitic flies and ichneumons, diseases due to micro-organisms (bacteria, etc.), and parasitic fungi, while perhaps the weather exercises a greater influence on the increase or decrease of insect pests than any other factor. Birds are admittedly of great value, but it is most improbable that they alone could control any of the more serious insect pests of this country, and the same statement would apply equally to any other enemy, if the weather be excepted.

The above remarks must not be taken as disparaging the services of birds, which are incalculable, but rather as a plea for more balance in considering the subject. An ally is not less valuable because we recognise and allow for his shortcomings. For the control of insect pests we must look to all their enemies for help, and at the same time must make use of all available artificial means that have proved effective in the past.

THE following Memorandum (No. C. L. 61/C.1), dated 13th June 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Pheasants.

Representations having been made by the Ministry of Food that from the point of view of the food supply a close time for pheasants is desirable, the Board of Agriculture and Fisheries have, under the Defence of the Realm Regulation 2R, made the Destruction of Pheasants Order, 1918, unde

THE following Notice was issued early in July by the Food Production Department of the Board :—

Grouse and Black Game.

The Board of Agriculture have issued an Order in terms similar to those of last year's Order, authorising the killing and taking, the buying, selling or possession of grouse and black game as from 6th August next, inclusive. This does not mean (it may be explained to avoid confusion) that *anyone* who feels so disposed is entitled to kill or take the game in question. It means merely that persons ordinarily entitled to kill this game (or to buy, sell, or be in possession of it) between the usual dates are this year enabled to exercise their rights somewhat earlier, namely, from 6th August onward to the date at which such exercise would normally be legal, if a special Order had not been issued.

AN ORDER (No. 648), dated 17th June, 1918, has been made by the Food Controller to the effect that :—

The Testing of Seeds Order, 1918.

1. *Regulation of Sale and Exposure for Sale of Seeds.*—On and after the 1st July, 1918, no person, except as hereinafter provided, or under the authority of a licence issued by or under the authority of the Food Controller shall :—

(*a*) Sell or expose for sale for sowing or keep deposited in any place for the purpose of sale for sowing, any seeds named in the First Schedule to this Order, unless a sample of the seed has previously been taken and tested in accordance with the provisions of this Order, either by or on behalf of the seller or at one of the following Government Stations :—For England and Wales, at the Seed Testing Station, Board of Agriculture and Fisheries, Food Production Department, 72, Victoria Street, London, S.W. 1 ; for Scotland, at the Seed Testing Station, Board of Agriculture for Scotland, 29, St. Andrew Square, Edinburgh ; for Ireland, at the Seed Testing Station, Department of Agriculture and Technical Instruction for Irelaud, Upper Merrion Street, Dublin ; or

(*b*) Sell or expose for sale for sowing any seeds named in the First Schedule to this Order unless :—

(i.) In the case of a sale the particulars required by this Order are correctly declared to the purchaser at or before the time of sale or delivery in writing, either in an invoice of the seeds or in some other form ; provided that it shall be sufficient for the purposes of this provision if the declaration is made by reference to a printed catalogue or to a price list containing the particulars required by this Order ;

(ii.) In the case of seeds exposed for sale, a copy of the declaration required by this Order in the case of sale is conspicuously exposed on or in connection with the seeds.

Provided that in the case of a packet containing pea or bean seed (not exceeding 2 lb.), or garden turnip, garden cabbage, garden kale, kohl rabi, Brussels sprouts, broccoli, cauliflower, carrot, parsnip, beet, or onion (not exceeding 8 oz.), where the germination of the seed sold or exposed for sale is at or above that standard specified in Part (IV.) of the First Schedule, the declaration mentioned in Sub-clause (*b*) shall not be required, and where the germination is below that standard the declaration need only state that fact.

2. *Particulars Required to be Declared.*—The particulars required by Clause 1 of this Order are :—

(*a*) In all cases the name and address of the seller ;

(*b*) In all cases the kind of seeds sold or exposed for sale and, in the case of cereals, clovers and sainfoin, the name of the variety of the seeds ;

(*c*) Except in the case of cereals, the percentage by weight of pure seed, provided that in the case of seeds named in Parts III. or IV. of the First Schedule to this Order a statement that such percentage is not less than 97 shall be sufficient.

(*d*) Except in the case of cereals, the total percentage by weight of injurious weed seeds present, where such total exceeds 1 per cent., provided that for the purposes of this Order no seeds but those of Docks or Sorrels (*Rumex* spp.). Cranesbills (*Geranium* spp.), Wild Carrot (*Daucus carota*, L.), Yorkshire Fog *Holcus lanatus*, L.), Soft Brome Grass (*Bromus mollis*, L. et spp.), are to be regarded as injurious weed seeds.

(*e*) A statement that Dodder is present if it is present to the extent of more than one seed thereof in 2 oz. in the case of Alsike Clover, White Clover, or Timothy or in 4 oz. of Red Clover, Crimson Clover or Lucerne.

(*f*) In the case of Sainfoin, where more than 5 per cent. by weight of Burnet (*Poterium* spp.) is present in the sample, the percentage so present.

(*g*) In the case of White Clover, Wild White Clover, and Alsike Clover where more than 2 per cent. by weight of any or all of the following, taken collectively, namely, Suckling Clover (*Trifolium dubium*, Sibth.), Hop Clover (*T. procumbens*, L., *T. parviflorum*, Ehrh., *T. angulatum*, Waldst., and *T. glomeratum*, L.) is present in the sample, the percentage so present.

(*h*) The percentage of seeds by number of the kind of which the sample purports to consist or of the pure seed as defined in Clause 8 (6) which germinate during a germination test, provided in the case of the seeds named in Parts II or IV. of the First Schedule to this Order, if the percentage of germination i not less than the Standard of Germination as set out in that Schedule, a statement to that effect shall be sufficient.

(*i*) In the case of Clovers, Trefoil, Lucerne, Sainfoin the percentage b number of hard seeds;

(*j*) In the case of Perennial Rye-grass, Italian Rye-grass, Meadow Fescu Cocksfoot, Timothy, Clovers, Lucerne, and Sainfoin seed, the country o origin (England, Wales, Scotland and Ireland being for this purpose treate as different countries) or, if the country of origin is not known to the selle a statement to that effect;

(*k*) In the case of mixtures of grasses or of clovers or of grasses and clove which may be sold or exposed for sale for agricultural purposes, the particula mentioned in paragraphs (*a*), (*b*), (*c*), (*d*), (*e*), (*g*), (*h*), (*i*), (*j*) shall be given respect of each kind of grass or clover seed in the mixture, and the proporti by weight of each kind shall also be given, provided that in a mixture of Pere nial Rye-grass and Italian Rye-grass the proportion by weight of each ki need not be stated if such mixture be declared to be a mixture of Perenn Rye-grass and Italian Rye-grass.

(*l*) In the case of a blend of varieties of the same species having differ countries of origin, the country of origin of each of the components shall given and the other particulars required by this Order shall be given in resp of the blend as a whole and not in respect of each component part.

(*m*) The month and year in which the test was made, unless such test been made within six months from the date of sale or exposure for sale.

3. *Scales of Latitude as regards Impurities and Germination.*—T particulars of the percentage of pure seed or of the percentage of se which germinate during a germination test shall not for the purpos these provisions be deemed to be incorrectly stated if they do not di from the actual percentage as determined by a Government Stat as defined in Clause 1 (*a*) by more than the percentage permitted by Scale of Latitude in the Second Schedule hereto.

4. *Powers of Entry and Sampling.*—Any person authorised England and Wales by the Board of Agriculture and Fisheries, Scotland by the Board of Agriculture for Scotland, and for Irelan the Department of Agriculture and Technical Instruction for Ire (hereinafter called the Official Sampler) may take, without payn samples of any seeds which have been sold or are being exposed for or are kept deposited in any place for purposes of sale, and may e on any premises for the purpose of taking such samples. The pe on whose premises the sample is taken or his representative shall

the Official Sampler all or any of the particulars required by Clauses 1 and 2 of this Order in respect of the samples so taken, and also the name and address of the person from whom the seeds were procured. The Official Sampler shall provide the person on whose premises the sample is taken or his representative at the time of sampling with a duplicate sample in a sealed packet on which the particulars as so furnished shall be stated.

Where a sample is taken by an official sampler it shall be sent by him to the Agricultural Department for that part of the United Kingdom in which the sample was taken, and the result of any test there made shall be regarded as conclusive evidence as against the person by whom the seeds were sold or exposed for sale unless such person or his representative shall within 14 days from the date of his receipt of a copy of the certificate of such result by notice in writing to the Government Department concerned require that further portions of the sample shall be tested by each of the Government Stations named in Clause 1 (*a*) of this Order, in which case the sample shall be so tested and the average result of the tests by the three Government Stations shall be regarded as conclusive evidence as against the person by whom the seeds were sold or exposed for sale.

5. *Certificate of Tests.*—In any proceedings in respect of an infringement of this Order, the production of the certificate as to the result of a test carried out in England or Wales given by the Board of Agriculture and Fisheries, or as to the result of a test carried out in Scotland given by the Board of Agriculture for Scotland, or as to the result of a test carried out in Ireland given by the Department of Agriculture and Technical Instruction for Ireland shall be sufficient evidence of the facts therein stated unless the defendant requires that the person who made the test shall be called as a witness.

6. *Exception of Certain Sales.*—Samples taken in Ireland under the "Weeds and Agricultural Seeds (Ireland) Act, 1909" (9 Edw. 7, c. 31) shall be deemed to be samples taken for the purpose of this Order.

7. This Order shall not apply to :—

(*a*) A sale of seeds as grown, if the seeds are not bought by the purchaser for the purpose of his own sowing ; but nothing in this exception shall affect the liability of the seller for failnre to deliver seed of the variety named at the time of sale ;

(*b*) A sale for delivery outside the United Kingdom.

8. *Definitions.*—For the purpose of this Order—

(1) "a sample" means a sample taken in the following manner :—

(*a*) In the case of seeds sold retail and in the case of seeds sold wholesale in quantities of 4 bush. or under, portions shall be drawn from the top, middle and bottom of the bag or bags in which the seeds are contained. All the portions so taken shall be well mixed and a representative sample of the whole shall be used.

(*b*) In the case of seeds sold wholesale in quantities of over 1 sack (4 bush.) or bag, portions shall be drawn from each sack or bag by means of a sampling instrument, these portions shall be thoroughly mixed and a representative sample of the whole shall be taken ; provided that when the amount sold consists of over 5 sacks or bags and not more than 10 sacks or bags portions need only be taken from one sack or bag in three ; and that if the amount sold is over 10 sacks or bags and not more than 50 sacks or bags, portions need only be taken from one sack or bag in five ; and that if the amount sold exceeds 50 sacks or bags portions need only be taken from one sack or bag in ten. In the case of seeds stored in heaps

or bins the sample shall be a sample from representative portions taken from various parts of the heap or bin so as fairly to represent the bulk.

(c) A sample shall be deemed to have been correctly taken if drawn from various parts of the seed whilst passing from a cleaning machine.

(2) The sizes of samples for testing shall be as follows :—

Seeds	Size of sample
Garden Turnip. ,, Cabbage. ,, Kale. ,, Kohl Rabi. Brussels Sprouts. Broccoli. Cauliflower. Carrot. Parsnip. Onion.	Not less than ½ oz.
Rye-grasses. Meadow Fescue. Cocksfoot. Crested Dogstail. Timothy. Alsike. White Clover. Field Turnip. Swede. Rape. Field Cabbage. ,, Kale. ,, Kohl Rabi. Mangel. Beet.	Not less than 2 oz.
Wheat. Oats. Barley. Rye. Tares or Vetches. Red Clover. Crimson Clover. Trefoil. Lucerne. Sainfoin.	Not less than 4 oz.
Peas. Dwarf French Beans.	Not less than 6 oz.
Broad Beans. Scarlet Runner Beans.	Not less than 8 oz.

(3) Where a sample has been taken in the presence of and sealed and marked by the seller or his representative, and the person drawing the sample or his representative, the sample shall be deemed to have been duly taken.

(4) When a sample of seed purporting to be one of a kind mentioned in the First Schedule to this Order contains an amount exceeding 15 per cent. by weight of one or more other kinds of seeds mentioned in the Schedule, the sample shall be deemed to be a mixture.

(5) " Impurities " mean all seeds or portions of seeds other than those of which the parcel purports to consist, whether they are those of weeds, harmless plants, or other cultivated plants, and also broken seeds of the kind of which the parcel purports to consist, so far as they are incapable of germinating, and also foreign matter, sand, grit, soil, fragments of roots, stems or flowers, single glumes, single flowering glumes and single pales, smut, ergot and other sclerotia, and also in the case of mangel and beet seed, all material which passes through a sieve having circular holes of two millimetres diameter.

(6) " Pure seed " means the seed after the impurities, as defined above, are eliminated, but, in the case of those species, varieties, stocks or strains of plants, the seeds of which cannot be distinguished from one another by expert examination, does not imply that the seed is genuine or true to name. In the case of Rye-grass, Meadow Fescue, Cocksfoot and Crested Dogstail, the seed shall be considered to be " pure " if it consists at least of the two united pales, regardless of the state of development or even the entire absence of the caryopsis or kernel within the pales.

9. *Revocation.*—The Testing of Seeds Order, 1917,* is hereby revoked as at the 1st July, 1918, but without prejudice to any proceedings in respect of any contravention thereof.

10. *Penalty.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

11. *Short Title.*—This Order may be cited as the Testing of Seeds Order, 1918.

* This *Journal*, December, 1917, p. 1031.

FIRST SCHEDULE.

KINDS OF SEEDS OF WHICH THE SALE AND EXPOSURE FOR SALE IS REGULATED.

Part I.

Perennial Rye-grass.	Red Clover.	Under whatever trade names sold.
Italian Rye-grass.	Alsike ,,	
Meadow Fescue.	White ,,	
Cocksfoot.	Crimson ,,	
Crested Dogstail.	Trefoil.	
Timothy.	Lucerne.	
	Sainfoin.	

Part II.

	Standard of Germination for Purposes of Clause 2 (h).
Wheat	90 per cent.
Barley	90 ,,
Oats	85 ,,
Rye	80 ,,

Part III.

Tares or Vetches.	Field Cabbage.
Field Turnip.	,, Kale.
Swede.	,, Kohl Rabi.
Rape.	Mangel.

Part IV.

	Standard of Germination for Purposes of Clause 2 (h).
Pea	75 per cent.
Dwarf and Broad Beans	80 ,,
Runner Beans	65 ,,
Garden Turnip	80 ,,
,, Cabbage	75 ,,
,, Kale	75 ,,
,, Kohl Rabi	75 ,,
Brussels Sprouts	75 ,,
Broccoli	75 ,,
Cauliflower	70 ,,
Carrot	60 ,,
Parsnip	50 ,,
Beet	100 ,,
Onion	65 ,,

SECOND SCHEDULE.

SCALES OF LATITUDE.

Germination.

Where the percentage of germination stated in the prescribed particulars are, except in the case of mangel and beet :—

		Allow per cent.
At or between 100–95 and	1– 5	± 4
,, ,, 94–90 ,,	6–10	± 6
,, ,, 89–85 ,,	11–15	± 7
,, ,, 84–75 ,,	16–25	± 8
,, ,, 74–55 ,,	26–45	± 9
,, ,, 54–49 ,,	46–50	±10

In the case of mangel and beet the scale of latitude allowed shall be, where the percentage of germination does not exceed 100, ±10 ; where it exceeds 100, ±15.

Purity.

Where the percentages of total pure seed stated in the prescribed particulars are :—

		Allow per cent.
At or between	100–90	± 2
" "	89–80	± 4
Below	80	± 5

Where the percentage is stated by the seller with a range, *e.g.*, 94–90 per cent., the percentage for the purposes of the Scale of Latitude shall be the mean. *i.e.*, in the above case 92 per cent.

Injurious Weed Seeds.

	Allow per cent.
Where the percentage of injurious weeds does not exceed 2 per cent.	± ·5
Exceeds 2 ,, but does not exceed 5 per cent.	± 1
,, 5 ,, ,, ,, ,, 10 ,,	± 2
,, 10 ,,	± 4

Notice.—By arrangement with the Board of Agriculture and Fisheries, the Board of Agriculture for Scotland and the Department of Agriculture and Technical Instruction for Ireland, the Food Controller has (until further notice) nominated those Departments, jointly, as the Government Department, by or under the authority of which licences under Clause 1 of the above Order are to be issued. All applications for licences should, until further notice, be addressed to The Food Production Department, Board of Agriculture and Fisheries, 72, Victoria Street, London, S.W. 1.

Sunflower Seed.

THE Food Production Department directs the attention of those who, at the Department's request have undertaken to grow sunflowers for seed purposes, to the following announcement :—

"The Ministry of Food announces that in the event of maximum prices being fixed for sunflower seed such prices on sales by growers will not be less than 50*s.* per cwt. The Ministry further announces that it will be ready to take over from Market Gardens Associations sunflower seed in sound condition, which is not sold locally, at a price of not less than 35*s.* per cwt., f.o.r., in bags, delivery to be made as and when required in quantities of not less than ½ cwt."

The Growing Grain Crops Order, 1918.

AN Order (No. 402), dated 5th April, 1918, was made by the Food Controller to the effect that :—

1. A person shall not feed any cattle, or permit or suffer any cattle to be fed with any growing wheat, oats, barley (except winter-sown barley) or dredge corn in such a way as to prevent the crop coming to maturity or prejudicially to affect the growth of such crop.

2. A person shall not cut or permit or suffer to be cut before maturity any growing crop of wheat, oats, barley (except winter-sown barley) or dredge corn.

3. For the purposes of this Order :—

"Cattle" includes, in addition to cattle usually so called, horses, sheep, goats, deer and swine.

Note.—This Order was inadvertently omitted from an earlier issue of the *Journal.*

The Potatoes (Registration of Wholesale Dealers) Order, 1918, as Amended by Order No. 623, 1918.

THE Food Controller, by The Potatoes (Registration of Wholesale Dealers) Order, 1918 (No. 555), dated the 22nd May, 1918, as amended by an Order (No. 623), dated 6th June, 1918, has provided that:—

1. All certificates of registration heretofore granted under the Potatoes Order, 1917,* by a Food Control Committee in Great Britain to any person as a wholesale dealer shall stand revoked as at the 1st July, 1918, so far as the same relate to eating potatoes, and as at the 1st September, 1918, so far as the same relate to seed potatoes.

2. A certificate of registration as wholesale dealer in potatoes granted or to be granted by the Food Control Committee for Ireland shall not authorise any dealings by such dealer outside Ireland in eating potatoes on or after the 1st July, 1918, or in seed potatoes on or after the 1st September, 1918.

3. Applications for new certificates of registration in Great Britain under the Potatoes Order, 1917, may be made by such persons and in such manner as the Food Controller may, from time to time direct. All such certificates shall be subject to such conditions as may be endorsed thereon or as the Food Controller may from time to time prescribe, and shall be revocable by the Food Controller at any time.

4. The holder of any certificate of registration as wholesale dealer in potatoes shall comply with such directions as to his dealings in potatoes as may from time to time be given by the Food Controller or under his authority.

5. After the date of this Order a Food Control Committee in Great Britain shall not grant to any person a certificate of registration as a wholesale dealer in potatoes.

The Potatoes (Distribution) Order No. 2, 1918.

AN Order (No. 617), dated 6th June, 1918, has been made by the Food Controller to the effect that:—

1. On and after the 10th June, 1918, until further notice, no person, other than a person licensed for this purpose by the Food Controller, shall move or consign any potatoes of the 1917 crop from Scotland to any part of England or Wales except the counties of Northumberland and Durham; and no person shall buy or agree to buy or take delivery of any such potatoes of the 1917 crop to be removed or consigned from Scotland to any part of England or Wales other than these counties except from a person so licensed.

Next Winter's Meat: Conservation Methods and the Revised Scale.

FARMERS throughout the country are following the advice of the Ministry of Food, and are generally withholding from market those cattle which will benefit by being out at grass during the next two months. In cases where immature beasts are brought forward for sale they are being returned by the auctioneers to their owners, or sold as stores. The expense of keeping cattle on grass is decidedly less than winter feeding, and the present low rate of slaughter means a substantial increase in production at a low cost to the producer.

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* Printed in this *Journal*, October, 1917, p. 765.

Apart from the necessity of conserving the meat supply of the country, there are reasons immediately connected with the War which make it desirable that industrial districts equipped with cold storage space should be largely fed on frozen meat. Naval and Military requirements have increased the work thrown on the railways by nearly 75 per cent. over that of normal times; yet railway and rolling stock and the number of skilled railwaymen have been diminished to serve the lines of communication in France. Live stock is difficult and troublesome to handle even with adequate labour and accommodation, and the consumption of frozen meat in the towns is one method of materially reducing the excessive strain on the railways. For the moment the rural population have the advantage, since it is as uneconomical to transport frozen meat to remote villages as to send cattle from those districts to towns. On the whole, the urban and industrial population are accepting the position as one of the minor inevitable hardships of war. Foreign beef must form a considerable proportion of the ration for some time to come; but recent shipments of beef are of a higher grade, and there is every reason to expect a continued improvement.

Movement of cattle is being more and more narrowly restricted. The farmer has had no incentive to seek a distant market since the establishment of a uniform system of grading levelled prices, and the process of definitely tying farmers to certain markets is now nearly somplete in all the live-stock areas. That market is generally the nearest to the farm; but where there are two markets within easy reach and the farmer has been in the habit of using the more distant one and desires to continue to do so, and in other special cases, the Area Live Stock Commissioner has discretion to meet his views as far as possible.

Why the Scale was Fixed.—The difference in the cost of summer and winter feeding has been taken into account in the prices fixed for cattle between October, 1918, and September, 1919. The present level of 75*s*. for first-grade cattle remains in force during the next four months, while grass is abundant. The price then rises gradually to 80*s*. in March, and will fall to the normal level again in July, 1919. In pre-war times feeding was estimated to cost 5 per cent. more in winter than in summer, and the difference is now very much greater owing to the high price of feeding stuffs and the increased cost of labour. The fixing of prices for so long a period ahead was essential because farmers required assurance that they would be recompensed for the labour and trouble involved before providing the necessary root crops for winter feeding. The rising scale, which will carry with it as a necessary corollary a small increase in the retail price of meat, was only agreed after consideration by a joint committee of the Agricultural Advisory Committee and the Consumers' Council.

The revised scale is as follows:—

CATTLE.

	Per cwt.		Per cwt.
October, 1918	75*s*.	April, 1919	80*s*.
November, 1918	75*s*.	May, 1919	80*s*.
December, 1918	76*s*.	June, 1919	80*s*.
January, 1919	78*s*.	July, 1919	75*s*.
February, 1919	79*s*.	August, 1919	75*s*.
March, 1919	80*s*.	September, 1919	75*s*.

In the case of sheep there is an increase of 1*s*. per head in November, 2*s*. in December, 3*s*. in January, 4*s*. in February, and between March and June of next year the increase on present prices is 5*s*., after which the price will again decline. (*National Food Journal*, 12th June, 1918.)

Slaughter of Cattle, Sheep and Pigs.

WHILE no complete data exists for a comparison of the slaughtering of cattle, sheep and pigs which took place in Great Britain during the months of January, February, March and April, 1917 and 1918, Mr. Clynes was able to give the House of Commons an approximate estimate, in which he distinguished, in regard to cattle, the numbers of oxen, bulls, cows and heifers; in regard to sheep, the total of ewes; and in regard to pigs, the total of sows. The estimate is set out in the following table:—

	Cattle.			Sheep.		Pigs.	
	Oxen and Heifers.	*Cows.*	*Bulls.*	*Ewes.*	*Others.*	*Sows.*	*Others.*
1917.							
January ..	170,000	53,000	8,000	160,000	539,000	25,000	264,000
February ..	148,000	54,000	9,000	98,000	555,000	21,000	220,000
March ..	154,000	57,000	12,000	80,000	647,000	21,000	208,000
April ..	142,000	45,000	10,000	65,000	622,000	22,000	198,000
1918.							
January ..	*102,000*	*42,000*	*5,000*	*166,000*	*707,000*	*25,000*	*176,000*
February ..	96,000	39,000	6,000	53,000	386,000	16,000	139,000
March ..	103,000	40,000	9,000	48,000	512,000	10,000	88,000
April ..	97,000	35,000	9,000	31,000	534,000	7,000	72,000

(*National Food Journal*, 12th June, 1918.)

Sale and Slaughter of Lambs.

THE following Notice was issued by the Board on the 25th June:—

The President of the Board of Agriculture and Fisheries wishes to notify flockmasters that he has ascertained from the Food Controller that there is no intention to restrict the sale and slaughter of lambs next year. He wishes, however, to warn sheep-breeders that they must not expect to be able to obtain any concentrated feeding stuffs for lambs, or that the fixed price per lb. for lambs will be in excess of that for sheep.

Cattle Feeding Stuffs: How the Deficiency may be Met.

WORKING horses, and, during the winter months, dairy herds, breeding stock and pigs, have the first call on the scanty stores of grain offals, meal and cake available for distribution among the live stock of the country. Town horses receive their allowance of oats under the Horses (Rationing) Order of the Board of Trade. The rations of concentrated food provided under existing certificates to farm stock by the Feeding Stuffs (Priority) Order of the Ministry of Food at present are:—

Calves under 6 months	¾ lb.	per day.
Breeding sows	4 ,,	,,
Store pigs	1½ ,,	,,

As regards poultry, 4 oz. of feeding stuffs per day is being allowed for selected fowls under conditions outlined in the last issue of *The National Food Journal*.* Fowls not coming under this selection scheme will be given certificates entitling them to at least 1 oz. of oats or an equivalent per hen bird per day.

No concentrated food is available at present for fattening cattle for slaughter; indeed the provision is unnecessary during the months when pasture is available, and for winter feeding the farmer is compelled to rely mainly on root crops, hay and straw. Milch cows have been excluded from the priority list until the late summer, though it has been

the custom in most districts to feed a certain amount of cake, even while the pastures are at their best.

The unavoidable deficiency in the quantities of concentrated food available for feeding farm stock of all kinds, and the consequent rationing of stock, have created a situation which is inducing farmers throughout the country to turn their attention to alternative methods of feeding which will render them to some extent independent of imported material. The Board of Agriculture have recently issued a series of leaflets on this question, which is of primary importance in relation to the maintenance of the home supply of meat, milk, butter, cheese and eggs under war conditions. The strain on tonnage will not cease even with the cessation of hostilities; consequently, the need for the application of the methods adopted during the present crisis will continue for some time to come. The "new" methods represent in many cases a return to an earlier system of farming before the heavy imports of oilcake simplified the problems of winter feeding.

The Feeding Stuffs Section of the Ministry of Food cannot, in present conditions, materially increase supplies of concentrated fodder, and no system of distribution, however perfect, will make good the deficiency of material. The increased use of home-grown fodder crops therefore presents the only real solution of the present difficulty.

The more important developments at the moment fall under the following heads:—

1. Soiling crops for dairy cows.
2. Silage.
3. Use of foods not hitherto fed to stock.

(*National Food Journal*, 26th June, 1918.)

Use of Rape Cake as a Feeding Stuff for Stock.

THE following announcement was made by the Board on 14th June:—Mr. Prothero desires to draw attention to the fact that although rape cake and rape meal when properly used are good feeding stuffs, it is necessary that caution should be exercised in feeding them to stock. They should always be fed mixed with other foods which do not contain any rape meal, and only a small quantity should be given at first. Any increase that may be made should be effected gradually, and careful observation should be kept on the animals to ensure that the food is agreeing with them.

Rationing of Poultry: Preliminary Details of Ministry of Food's Scheme.

IT is common knowledge that there is a shortage of feeding stuffs for live stock and poultry. For this reason a general scheme of rationing is being considered by the Ministry of Food, and particulars of it will be announced later.

So far as poultry is concerned, the scheme will provide for a ration of food being granted for all hen birds hatched since January 1st, 1916, but no special guarantee will be given that the ration can be provided, owing to the shortage above mentioned and the demands of certain classes of other live stock.

The Ministry of Food, in conjunction with the Boards of Agriculture for England and Scotland, are introducing a separate scheme for the maintenance of the best breeds of poultry for utility purposes, and 50,000 tons of poultry feeding stuffs have been allocated to provide a sufficient ration for a certain number of such poultry. The Ministry

of Food have undertaken to carry out the scheme, and the machinery employed for the allocation of this quantity of poultry feeding stuffs will be similar to that which it is intended to employ for the rationing of all live stock. In each county, with certain exceptions, there now exists a Feeding Stuffs Committee, and it has been decided for the carrying out of the work, and having regard to the necessity for selection as well as rationing, that a Poultry Sub-Committee of the Feeding Stuffs Committee in each area should be formed, consisting of five representative poultry-keepers. Poultry-keepers will be notified in the poultry Press of a public meeting which will be held in each area at an early date for the purpose of nominating the members of the Sub-Committee for subsequent appointment by the Ministry of Food. In order to obtain representation on this Committee of Poultry-keepers from as wide an area as possible each area will be divided roughly into five sections and each section will be entitled to a place on the Committee.

Failing such nominations the Ministry of Food themselves will appoint the members of the Sub-Committee with the help of the Feeding Stuffs Committee.

In order to facilitate the proceedings at the nomination meetings referred to, notice must be given to the Ministry of Food of all names of poultry-keepers who will be nominated to the Poultry Sub-Committees to be formed in each area. The notice should take the following form:—

> We, the undersigned, being poultry-keepers in the above county, give notice that we propose to nominate (Name).................... (Address) ....whom we regard as a representative poultry-keeper in the county of....................... to serve on the Poultry Sub-Committee for the area. We have ascertained that he will be prepared to serve, if appointed.
>
> Name.................... Address....................
>
> Signature and address of at least three poultry-keepers.

This notice must be sent to the Secretary, Feeding Stuffs Section, Ministry of Food, County Hall, London, not later than seven days prior to the date of the meeting.

Notices regarding the scheme will be issued from time to time through the poultry and farming Press and to the various poultry societies and organisations.

The Ministry of Food, in the carrying out of this scheme for the preservation of a certain number of fowls of the best breeds, ask for the full co-operation of individual poultry-keepers, poultry societies, and the poultry Press.

A brief summary of the provisions of the special scheme as applied to England and Wales is appended, and similar provisions will apply to Scotland, with slight modifications owing to certain different conditions.

In order to obtain the special ration of 4 oz. of feeding stuffs per day, fowls must come within the following conditions:—

First Grade of Breeding Stock.—A. Fowls must be utility breeding stock for egg production or breeding stocks of high utility quality.

B. The fowls must be pure-bred stock.

C. The standard of health of the flock must be high.

D. That for a period of at least two years this stock has been bred to meet the above requirements.

E. That the owner of the stock will give an undertaking that if his stock receives preferential treatment he will supply the public with hatching eggs, day-old chicks, and older stock at a cost no greater than his 1917 charges.

F. Selective breeding must have been practised in the flock.

Second Grade of Breeding Stock.—Stock to be included in this Grade must meet the requirements (A), (B), (C), (D), and the owner must comply with the Condition (E).

Note 1.—Although no thorough system of selecting the best females has been practised, yet if the best available males have been regularly used such stock will be worth preserving and should be included in the Second Grade. The Second Grade fowls should only receive rations after the demands of the owners of First Grade birds have been satisfied.

Note 2.—A certain proportion of the allotted 50,000 tons of feeding stuffs will be reserved for the preservation of the best utility stocks of ducks, turkeys and geese.

The ration will be supplied in the form of a grain mixture and a mash in dry form in equal proportions; but in the circumstances prevailing the contents of such mixtures may vary from time to time, and poultry receiving a ration under the special scheme can in no circumstances receive a ration under the general scheme of rationing. In order to avoid unnecessary transport, the mixtures will be made at mills near the ports.

Owners of poultry which come within the above conditions must make application in due course on the prescribed form to the Secretary of the Poultry Committee of their area, and if their applications are accepted they will receive certificates entitling them to a certain amount of feeding stuffs through the retailer (supplier) whom they have nominated in their application and with whom they must deposit their certificates. This supplier will obtain from the mills the aggregate amount to satisfy the certificates. The Poultry Sub-Committees, under the supervision of the officers of the Ministry of Food and the Board of Agriculture, will be responsible for satisfying themselves that the poultry, for which special rations are asked for or granted, comply with the proper conditions, and will closely scrutinise applications in view of the fact that the quantity of poultry feeding stuffs under this scheme is severely limited.

A wilful misstatement on the application form will constitute an offence under the Defence of the Realm Act.

Apart from the brief summary given above poultry-keepers are referred for further information to the notices which will appear from time to time in the poultry Press and to announcements which will be made at the meeting. (*National Food Journal*, 12th June, 1918.)

Rations for Poultry.

UNDER the rationing scheme for the preservation of the best breeds of utility poultry, arrangements have been made in each county for poultry-keepers to hold public meetings at which a representative poultry committee will be nominated to carry out the work of selection. A full list of all such meetings may be had on application to the Secretary of the County Feeding Stuffs Committee, or to the Ministry of Food, New County Hall, Westminster Bridge Road, London, S.E. 1. Application forms for rations under the scheme will be available at these meetings, or thereafter from the secretary of the local committee. All applications must be made not later than 20th July. (*National Food Journal*, 10th July, 1918.)

Poultry Corn: Unfounded Charges of Profiteering.

ARTICLES and correspondence which have appeared recently in the general Press indicate that the writers are under the impression that buyers have to pay for damaged grains double the price at which farmers are permitted to sell the best qualities. It is necessary to correct such statements, as they are entirely opposed to fact.

Under Orders issued in the autumn of 1917 by the Food Controller, the use of wheat, rye and barley is restricted to manufacture for the purposes of human food and to other licensed purposes; but the restrictions do not apply to grain which is so badly damaged or so inferior in quality as to be unfit for those purposes.

Under the Grain (Prices) Order, 1917,* which deals with home-grown grain, the maximum price for this damaged or inferior grain is fixed at 7*s.* per qr. in the case of wheat and rye, and 7*s.* 9*d.* per qr. in the case of barley, *less than the maximum prices for sound grain.*

In the case of imported grain, damaged wheat, rye and barley are defined under the Damaged Grain, Seeds and Pulse (Prices) Order, 1917,† as meaning "such articles as are in the ordinary course of trade classed as damaged," and damaged imported oats as "oats so damaged as to be unsuitable for feeding purposes without being reconditioned by kiln drying or other mechanical treatment." The maximum prices of all these damaged imported articles are fixed by the Food Controller at prices averaging rather lower than the maximum permitted prices for damaged home-grown grain.

A difficulty arose over the price of sea-damaged grain (salved from torpedoed vessels), because of maximum prices being paid for the wet-damaged grain, so that after kiln drying and accounting for charges and loss of weight, the price of the reconditioned grain was considerably higher than the schedule price under the Order. In order to remedy this anomaly the Food Controller issued on 10th May an amending Order under which the maximum price of imported grain damaged by water and afterwards reconditioned or rendered more merchantable by kiln drying or other like treatment was fixed on and after 20th May at the schedule rates, in the original Order, for the dry weight. The following are the maximum prices ruling to-day for damaged grain:—

Home-grown Grain.	*s.*	*d.*	*lb.*
Damaged wheat and rye	70	0	504
Damaged barley	55	0	448
Oats improperly cleansed or containing an undue admixture of soil	43	6	336

The above are producers' prices.

Imported Grain.	*s.*	*d.*	*lb.*
Graded feed wheat	72	0	480
Damaged wheat and rye	65	0	480
,, barley	55	0	448
,, oats	41	0	336

The above prices are importers' prices *ex* quay, store, or granary at the port of discharge. (*National Food Journal*, 26th June, 1918.)

* Printed in this *Journal*, September, 1917, p. 673.
† ,, ,, ,, December, 1917, p. 1026.

Revised Prices for Milk and Cheese.

EXTENSIVE inquiries carried out in different parts of the country by the Ministry of Food have proved that milk production could not be maintained at its present level in many cases without a substantial increase in the prices set out in the Milk (Summer Prices) Order issued in March last.* Provision was made for this contingency in that Order (Clause 3*a*), which provided that the Food Controller might by notice fix for any area such higher prices as were justified by the local cost of production.

During the last two months Advisory Committees, on which the local Food Committees, the War Agricultural Committees, and the Ministry of Food were represented, have sat in various areas of Great Britain to consider the local cost of production. The adjustment of prices to the many variations in the costs of dairy farming in different areas shown by these inquiries would have entailed such serious complications in fixing the retail prices of milk that it has been decided to fix a flat rate all over the country sufficient to meet average costs in the districts where costs are heavy.

The addition made by the Milk (Summer Prices) Amendment Order, 1918, now issued will advance producers' prices to the following level :—

England and Wales.	*s.*	*d.*	*Scotland.*	*s.*	*d.*
June	1	4	June	1	4
July	1	6	July	1	4
August	1	7	August	1	6
September	1	7	September	1	8

This change will involve an automatic increase in the charge to the consumer of 1*d.* a quart. Before coming to this decision to increase the cost of a food of first necessity to the children of the nation the Ministry of Food satisfied themselves that the step was necessary in order to safeguard supplies. It has to be borne in mind that if the cost of dairying is out of proportion to prices obtainable, the farmer may turn to other more remunerative branches of farming. The course adopted was fully discussed with the Agricultural Advisory Committee and with the Consumer's Council, and commanded general assent.

It is provided that the Food Controller may, if he thinks fit, cancel or modify any contract for the sale of milk subsisting on June 9th. Where this power is not exercised, the contract price for any full milk (but not skimmed milk or buttermilk) is to be deemed to be increased by 4*d.* per gal.; but the buyer may, if he so desires, determine the contract.

The Order also extends the power already given to Food Control Committees under the terms of Clause 14 (*a*) (1) of the Milk (Summer Prices) Order, 1918, so that with the sanction of the Food Controller Food Control Committees may direct any person delivering liquid milk, condensed milk, dried milk, or milk preparations in their area to deliver such milk to any consumer or class of consumers in priority to any other person in their area. (*National Food Journal,* 12th June, 1918.)

* See this *Journal*, April, 1918, p. 110.

AN Order (No. 622), dated 8th June, 1918, made by the Food Controller contains the following main provisions :—

The Milk (Summer Prices) Amendment Order, 1918.

1. On and after the 9th June, 1918, until further notice, the maximum price for milk applicable under the Milk (Summer Prices) Order, 1918 (hereinafter called the Principal Order)* shall be increased by the sum of 4*d.* per imperial gal.

2. Where in exercise of the powers conferred by Clause 2 or Clause 5 of the Principal Order the maximum price for milk has been duly varied by a Food Control Committee: then as from the 9th June, 1918, until the Committee shall have otherwise determined, the maximum price as so varied shall be deemed to be increased by a sum at the rate of 4*d.* per imperial gal.

3. The following provisions shall have effect in relation to any contract for the sale of milk (excluding butter milk, skimmed milk, condensed milk, dried milk and other milk preparations) subsisting on the 9th June, 1918, so far as the same relates to milk to be delivered on or after that date.

The contract price for any such milk shall be deemed to be increased by a sum at the rate of 4*d.* per imperial gal., the buyer having the option (to be exercised by notice in writing to the seller before the 19th June) of determining the contract as at the 19th June, 1918. Provided that the provisions of this Clause shall not apply to such contracts as may be excepted from the operation thereof by the Food Controller.

4. The Food Controller may cancel or modify in such manner as he thinks fit any contract subsisting on the 9th June, 1918, for the sale of any milk (including butter milk, skimmed milk, condensed milk, dried milk, or other milk preparations) so far as the same relates to milk to be delivered thereunder on or after that date.

AN Order (No. 735), dated 22nd June, 1918, has been made by the Food Controller to the effect that :—

The Milk (Summer Prices) Order, 1918: General Licence.

Notwithstanding the provisions of Clause 8 of the Principal Order (No. 296 of 1918)* the Food Controller hereby authorises until further notice :—

(*a*) Sales of milk by the pennyworth or two pennyworth ; or

(*b*) Sales of any fraction of a gill, pint, quart, or gallon of milk. Provided that the maximum price is not exceeded.

Milk Supply: Question in Parliament.

MAJOR WHEELER : Is it proposed to take control of the distribution of the milk supply of Great Britain ; and, if so, before coming to this decision, have the Ministry heard the views of the leading agricultural societies on the proposal ?—MR. CLYNES : It has been decided with the approval of the Agricultural Advisory Committee of the Ministry of Food, on which are represented all the leading agricultural societies in the United Kingdom, that the Ministry of Food should assume the responsibility for the wholesale collection, utilisation, and distribution of milk. (*National Food Journal*, 26th June, 1918.)

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* See footnote on opposite page.

AN Order (No. 578), dated 29th May, 1918, has been made by the Food Controller to the effect that :—

British Cheese (Requisition) Order, 1918.

1. This Order shall apply to all British-made Whole Milk Cheese manufactured in Great Britain on or after the 1st June, 1918, other than (1) Caerphilly Cheese, (2) Wensleydale Cheese, (3) Stilton Cheese, (4) Soft Cheese, (5) Cheese weighing 2 lb. or less uncut.

The expression " Stilton Cheese " shall not include Loaf Cheddar.

2. (*a*) Every person who manufactures in Great Britain any cheese to which this Order applies shall place all such cheese at the disposal of the Food Controller and shall deliver the same to such persons and in such quantities and at such times as the Food Controller may from time to time prescribe by directions under this Order.

(*b*) This Clause shall not, except the Food Controller in any particular case otherwise directs, apply to a person who normally while manufacturing cheese manufactures less than 56 lb. of Cheese per week.

3. Pending any such direction no person concerned shall dispose of any such cheese, whether in pursuance of any contract or otherwise and shall take such steps as may be reasonably necessary to preserve such cheese in good condition.

4. The arbitrator to determine in default of agreement the compensation to be paid for any cheese requisitioned under this Order shall be appointed by the Lord Chancellor of Great Britain as respects cheese manufactured in England or Wales, and by the Lord President of the Court of Session as respects cheese manufactured in Scotland.

Note.—All correspondence with respect to this Order should be addressed to the Secretary, Ministry of Food (Cheese Section), Palace Chambers, London, S.W. 1.

Makers whose cheese is requisitioned will be required to deliver their cheese to the Food Controller through a factor nominated by them and approved by the Food Controller. The official forms of nomination should be in the hands of makers before the 10th June, 1918. Any maker who, by that date, has not received an official form or nomination, should at once communicate with the Ministry of Food.

AN Order (No. 579), dated 29th May, 1918, has been made by the Food Controller to the following effect :—

British Cheese (Requisition) Order, 1918: General Licence.

The Food Controller hereby authorises every person from whom cheese is requisitioned under the above Order to continue until further notice to supply to his employees, and, in the case of a cheese factory, also to suppliers of milk to such factory, cheese for consumption in the household of the recipient at the first-hand price for the time being in force; provided that returns are made fortnightly to the Food Controller of the total quantities disposed of under this licence during the preceding fortnight.

This licence may at any time be revoked by the Food Controller either generally or as respects any particular person.

Cheese Inspection Scheme.

IN order to ensure the greatest possible output of cheese throughout Great Britain during the present season, the Ministry of Food have appointed four cheese inspectors, who are giving all the assistance in their power to cheese-makers. It has been found that in some factories, owing to local difficulties of various kinds, existing plant is not being utilised to the fullest extent, and it is the business of the new cheese inspectors to report any special difficulties in regard to supplies of liqnid milk or other matters to the Ministry of Food, and to do everything in their power to assist both factory managers and farmers to increase their outpnt to the maximum. The names and addresses of the cheese inspectors for the various divisions are :—

Bristol, Reading and Cardiff Food Divisions.—Mr. J. Hugh Mackie, Park Cottage, Castle Cary, Somerset.
Birmingham, Nottingham, Preston and Carnarvon Food Divisions—Mr. Sutherland Thomson, Colonial House, Tooley Street, S.E.
Newcastle, Leeds, Cambridge and Home Counties Food Divisions—Mr. H. W. Beresford, Bay Tree Farm, Milton, near Weston-super-Mare.
All Scotland—Mr. W. McFadzean, 42, Portland Street, Kilmarnock.

Supplies of milk are still comparatively abundant, and it is regarded by the Ministry of Food as essential that as high a proportion of this liquid milk as possible should be converted into food for winter use, either in the form of dried or condensed milk or cheese.

Manufacturers of whole milk cheeses, with the exception of Caerphilly, Wensleydale or Stilton cheese, soft cheese or cheeses weighing 2 lb. or less uncut, are required to place their product at the order of the Food Controller by the British Cheese (Requisition) Order, 1918.* This requisitioning Order only applies to makers on a considerable scale, producers whose output is normally less than 56 lb. of cheese a week being excluded from its operation. Before June 10th all cheese-makers who come under the Order should have received through their Producers' Association, or from factors appointed under the distribution scheme, a form on which to nominate the factor through whom delivery should be made. By a general licence issued under the Order producers whose cheese is requisitioned are still entitled to supply their employees, and, in the case of factories, their suppliers of milk, with cheese for their own consumption at first-hand prices, provided that a fortnightly return of the quantities so supplied is returned to the Food Controller. (*National Food Journal*, 12th June, 1918.)

Control and Distribution of Cheese.

FOR the purposes of the controlled distribution of British-made cheese, the following areas have been fixed in England, Scotland and Wales :—

1. *South of England*, including the following counties : Northampton, Norfolk, Hunts, Suffolk, Bedford, Cambridge, Essex, Hertford, Middlesex, Surrey, Sussex, Kent, Berks, Wilts, Hants, Isle of Wight, Oxford, Buckingham, Cornwall, Devon, Dorset, Somerset, Gloucester, Channel Islands, Glamorgan, Monmouth, Brecon, Radnor, Cardigan, Carmarthen, Pembroke.

* See p. 492 of this *Journal*.

2. *North of England*, including the following counties: Northumberland, Durham, Cumberland, Westmorland, Lancashire, Cheshire, Flint, Anglesey, Carnarvon, Denbigh, Merioneth, Montgomery, Salop, Hereford, Worcester, Stafford, Warwick, Leicester, Rutland, Notts, Lincoln, Derby, Yorkshire, Isle of Man.

3. *Scotland*: The whole.

For the purposes of this scheme the expression "British-made cheese" does not cover the Caerphilly, Wensleydale and Stilton makes, nor soft cheese, nor cheeses of 2 lb. weight and less uncut; nor does it necessarily cover the cheese of producers who do not normally make 56 lb. per week in the season, unless satisfactory arrangements can be made for the delivery of their small lots. The distribution is being kept as close as possible to the 1916 conditions. Retailers, except in special circumstances, receive supplies on the basis of their 1916 sales; and the links between makers, factors and retailers are preserved so far as is practicable. Distribution is not rigidly limited to a percentage of 1916 supplies, and adjustments will be made where a change in the population or the occupational features of any district since 1916 makes this necessary and desirable. Makers nominate a factor with whom they did the largest portion of their business in 1916, if such a factor is within their area; wholesalers choose factors for their supplies on the same basis; and retailers make application similarly, either to an appointed factor or to a wholesaler.

Exportation to Ireland is forbidden under this scheme. Factors acting as agents of the Ministry of Food are responsible for payment to the maker at the rates fixed by the Food Controller, and receive, weigh, classify, store and take care of the cheese until it is required for distribution, when they perform the function of first-hand distributors. Dealers in British-made cheese will receive such cheese as far as supplies permit, but they must be prepared to accept quantities of imported cheese to make up their allotments from time to time.

Caerphilly cheese is being distributed under a scheme somewhat different in detail, though intended to be based on the 1916 distribution. Three firms have been appointed as factors under the Caerphilly scheme—Messrs. Palmer, Sons and Toogood, in conjunction with Messrs. Body and Son, at Highbridge; Messrs. Collett, Whitefield and Co., Ltd., Colonial Buildings, Cardiff; and Mr. L. A. Parfitt, Cambrian Road, Newport. Makers of Caerphilly cheese must nominate one of the three firms to receive their supplies. These factors store the cheese for the Ministry, and act as first-hand distributors under the instructions of the Caerphilly Cheese Committee, 76, Victoria Street, Bristol. It is proposed to requisition all Caerphilly cheese made in Great Britain. (*National Food Journal*, 10th July, 1918.)

THE following Notice was issued by the Food Production Department of the Board towards the end of June:—

Scheme for Collection of Surplus Fruit.

There will be a very serious shortage of fruit in this country this year; and it is extremely important that not a single ounce should be wasted. Although there will be no general surplus, it is extremely probable that in certain villages possibly even in certain suburbs, there will be more fruit grown than can be economically consumed at once, or conveniently preserved by

the ordinary domestic means. It is imperative that all such surpluses, however small, should be utilised to the best advantage.

Fortunately, this year we have the machinery for the collection of surplus fruit from practically any district and its effective preservation. Seventeen counties have already formed registered marketing societies under the scheme of the Food Production Department; fourteen other counties are about to follow suit. Very shortly it is to be hoped every county in England and Wales will have its county marketing organisation.

Even where there is no county organisation—perhaps especially where there is no county organisation—growers who are likely to find themselves at an early date with more fruit than they can consume or preserve satisfactorily, should make immediate arrangements with a view to this fruit being utilised in the national interest. They should at once notify the Marketing Section, Food Production Department, 72, Victoria Street, London, S.W. 1, of the fact that they anticipate having fruit to dispose of, and state what is its nature and the probable quantity. They need not stamp the letter making this notification.

Efforts are being made by the Food Production Department this season to bring every possible pound of fruit available into the licensed jam factories. It is believed that, although the individual surpluses may be small, a considerable total can be obtained from the private grower as distinct from the professional grower. The needs of the country in the matter of jam are approximately known, and they far exceed the fruit supplies at present in sight. The duty of every private grower, however small, is therefore obvious; he will be serving the national interest as well as his own by getting promptly into touch with the Marketing Section of the Food Production Department. From this Department he can obtain a list of the nearest jam factories and particulars of prices and consignments acceptable by rail. Where there is a county marketing society he will be brought into contact with this society; where there is no marketing society he will be advised as to the best course to pursue.

AN Order (No. 641), dated the 14th June, 1918, has been made by the Food Controller and contains the following main provisions:—

The Soft Fruit (Sales) Order, 1918.

PART I.—RESTRICTIONS.

1. Except under the authority of the Food Controller a person shall not take delivery in the United Kingdom of any of the varieties of fruit mentioned in the Schedule (hereinafter called Soft Fruit) or of the pulp of any soft fruit where such soft fruit or such pulp is outside the United Kingdom on the 17th June, 1918.

2.* (a) On and after the 17th June, 1918, a person who grows in the United Kingdom any soft fruit shall not sell or deliver or offer to sell or deliver any soft fruit so grown except to—

(i.) A licensed jam manufacturer; or

(ii.) A recognised fruit salesman who has given to the grower a dated and written undertaking signed by the salesman that he will re-sell such fruit only to a licensed jam manufacturer.

* These Clauses have been modified by a General Licence (Order No. 732), dated 21st June, 1918.

(b) This Clause shall not apply to a grower in relation to any variety of soft fruit where his total crop of that variety grown in the United Kingdom during the 1918 season is less than 1 cwt.

3.* Where a recognised fruit salesman has brought from a grower any soft fruit to which Clause 2 applies, he shall not sell such fruit except to a licensed jam manufacturer.

4. (a) On and after the 17th June, 1918, a licensed jam manufacturer shall not buy or take delivery of any soft fruit, wherever grown, or use any fruit bought by or delivered to him for any purpose other than the purpose of manufacturing jam or pulp for sale.

(b) This Clause shall not apply to soft fruit bought by retail by and used for the household consumption of a jam manufacturer.

5. No pulp made from any soft fruit shall on or after the 17th June, 1918, be sold or delivered to any person other than a licensed jam manufacturer, or be used for any purpose except the manufacture of jam.

PART II.—PRICES.

6. On and after the 17th June, 1918, no soft fruit grown in the United Kingdom shall be sold by the grower thereof at a price exceeding a price at the rate set out against such fruit in the Schedule, free on rail, ship or barge at the grower's station, port or wharf, together with the additional charges permitted by this Order. Such price shall include all charges for picking and packing.

7. The additional charges permitted on a sale by the grower are :—

(a) Where the fruit is delivered by the grower to the buyer's premises or for sale in a market the customary charges for such delivery not exceeding in any case an amount equal to the cost of transport from the grower's station, port or wharf, to the buyer's premises or the market in which the fruit is sold.

(b) Where packages are provided by the grower :—

(i.) A charge not exceeding the rate of 40s. per ton of fruit for the use of pecks and strikes ; 30s. per ton of fruit for the use of half sieves, and 25s. per ton of fruit for the use of baskets or other usual packages (other than chip baskets and punnets), all pecks, strikes, half sieves, baskets or other packages to be returned to the grower carriage paid.

(ii.) 40s. per ton of fruit delivered in chip baskets or punnets, the chip baskets and punnets to be non-returnable.

(c) All market tolls actually paid in respect of the fruit by the grower.

(d) Where strawberries are plugged by the grower before delivery to the buyer, a sum at the rate of £4 per ton of fruit so plugged.

8. On and after the 17th June, 1918, no soft fruit grown in the United Kingdom shall be sold by any person, other than the grower of the fruit sold, at a price exceeding by more than 30s. per ton the rate set out against such variety of fruit in the Schedule, together with the additional charges permitted by this Order to be paid to the grower to the extent to which the same are payable or have been paid, and together also with the following additions where applicable :—

(a) The amount of the transport charges, if any, paid or payable by such person in respect of the fruit and not included in the sum paid to the grower ; and

(b) The amount of any market tolls actually paid by such person in respect of such fruit ;

(c) A sum at the rates and on the terms set out in Clause 7 (b) hereof in respect of packages provided by such person ;

(d) A sum at the rate of £4 per ton of fruit in respect of strawberries plugged by such person.

* See note on p. 495.

9. This part of the Order shall not apply to a sale by retail where the total quantity included in the sale is not more than 5 lb. of any one variety of fruit.

PART III.—GENERAL.

This part deals with contracts, exceptions, fictitious transactions, interpretations, etc.

THE SCHEDULE.

Variety of Fruit.	*Price.* £
Black currants	60 per ton.
Red currants	32 "
Raspberries	37 "
Strawberries (Stirling Castle and Scarlets)	44 "
Strawberries of any other variety	40 "

THE following Letter (No. C. L. 30/H), dated 14th June, 1918, has been addressed to Horticultural Sub-Committees by the Food Production Department of the Board:—

Manufacture of Cardboard Containers for Jam.

SIR,—I am directed by the Food Production Department to inform you that in order to overcome the shortage of glass and earthenware jam jars, arrangements can be made for the manufacture of a large quantity of cardboard containers capable of holding 7 lb. of jam, provided a sufficient number are required.

The Department will, therefore, be glad if your Committee will make inquiries as early as possible and inform them whether containers of this nature will meet the need of local committees or societies who are undertaking the communal manufacture of jars.

I am, etc.,
(Signed) G. F. MIDDLETON,
For Controller of Horticulture.

THE following Letter, dated 10th June, 1918, was addressed to a correspondent by the Board:—

The Raising of Rents of Agricultural Land to Meet Increased Outgoings.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to refer to your letter of the 29th ult., and I am to say that Mr. Prothero cannot undertake to propose legislation extending the provision of the Increase of Rent and Mortgage Interest (War Restrictions) Acts to agricultural land. Those Acts were passed to restrict the rents of small houses, which otherwise would have risen to an unreasonable level owing to the stoppage of building and other causes of a local character, and as a corollary the raising of the interest on mortgages of such houses was also restricted.

In the case, however, of agricultural land there is no statutory restriction on the raising of the rent to such a figure as could have been obtained without Part I. of the Corn Production Act, and the Board have no reason to suppose that an increase of rent would be regarded as being unreasonable if required to meet additional expenditure by the landlord in consequence of the increased value of tithe rentcharge or an increase in the rate of interest on a mortgage, or other outgoings.

I am, etc.,
(Signed) F. L. C. FLOUD.

The Strawberries (Retail Prices) Order, 1918.

AN Order (No. 733), dated the 21st June, 1918, has been made by the Food Controller fixing, with certain exceptions, the retail price of strawberries.

THE following Memorandum (C.L. 52/C. 1), was issued by the Food Production Department of the Board on 23rd May, and was omitted from last month's *Journal* for reasons of space:—

Possession of Cottages.

1. The Increase of Rent, etc., Act, 1915, restricts the power of a Court to make an order for the recovery of possession of a house let as a separate dwelling where such letting does not include any land other than the site of the dwelling-house and a garden or other premises within the curtilage of the dwelling-house and where either the rent on the 3rd August, 1914, or its then rateable value did not exceed £26.

2. As a result of the passing of the Increase of Rent, etc., (Amendment) Act, 1918, the effect in England and Wales of Section 1 (3) of the Act of 1915, which deals with this matter, as amended, is as follows, the Amendments being shown by the words in italics:—

No order for the recovery of possession of a dwelling-house to which this Act applies or for the ejectment of a tenant therefrom shall be made so long as the tenant continues to pay rent at the agreed rate as modified by this Act and performs the other conditions of the tenancy, except on the ground that the tenant has committed waste or has been guilty of conduct which is a nuisance or an annoyance to adjoining or neighbouring occupiers, or that the premises are reasonably required by the landlord for the occupation of himself or some other person in his employ, or in the employ of some tenant from him, or on some other ground which may be deemed satisfactory by the Court making such order, and where such order has been made but not executed before the *2nd May*, 1918, the Court by which the order was made may, if it is of opinion that the order would not have been made if this Act had been in operation at the date of the making of the order, rescind or vary the order in such manner as the Court may think fit for the purpose of giving effect to this Act.

The expression "landlord" does not include any person who, since th 30th September, 1917, *has become landlord by the acquisition of the dwelling house or any interest therein otherwise than by the devolution thereof to hi under a settlement made before the said date, or under a testamentary di position or an intestacy.*

The preceding paragraph does not apply in any case where the Cou is satisfied by certificate given by or on behalf of the Board of Agricultu and Fisheries that the premises in question are required for the occupatic of a person engaged or employed in agricultural work of urgent nation importance.

3. While the Bill was under discussion an undertaking was give by the Minister in charge that no certificate would be given witho consideration as to whether it is a matter of grave national necessi from the point of view of carrying on the farm that the applicant shou obtain possession of the cottage, and as to whether suitable and adequa house accommodation can be obtained for the person proposed to evicted.

4. Where the landlord has acquired a cottage on or before the 3c September, 1917, he may obtain an ejectment order from the Court he can satisfy the Court that he requires the cottage for the occupati of himself or of some person in his employ, or in the employ of so tenant from him, or on any other ground which would have entit him to an order of ejectment under the Act of 1915.

5. Where, however, a landlord has acquired by purchase or on lease a cottage since the 30th September, 1917, and requires possession of it on the ground that the cottage is reasonably required by him either for his own occupation or for the occupation of a person employed by himself or by some tenant from him, he cannot obtain an order from the Court unless he produces a certificate from the Board of Agriculture that the cottage is required for the occupation of a person engaged on agricultural work of urgent national importance.

6. To enable the Board to deal with an application for such a certificate, they propose that it shall be referred to the Agricultural Executive Committee, who will be asked to inquire into the facts, and, if they recommend the application, to forward to this Department a full report on the facts with their opinion on the questions (1) whether the cottage is required for the occupation of a person engaged or employed on agricultural work of urgent national importance; (2) whether it is a matter of grave national necessity for the carrying on of the farm that possession of the cottage should be obtained; and (3) whether suitable and adequate house accommodation can be obtained for the person whom it is proposed to evict.

It would be desirable in all cases that the person proposed to be evicted should be afforded an opportunity of stating his views.

The Board will, after consideration of the Report of the Committee, decide whether a certificate should be granted.

Minimum Rates of Wages, etc., Fixed by the Agricultural Wages Board.

THE rates of wages, hours, etc., stated below, have been fixed by the Agricultural Wages Board for the undermentioned counties. The rates fixed are on the basis of a six-day working week of 54 hours in the eight summer months from March to October inclusive, and of 48 hours in the four winter months from November to February inclusive, except in the case of Oxfordshire where they are on the basis of a six-day working week of 52 hours all the year round :—

District.	Wage.	Hours.	Overtime Rate.	Age.	Date of Coming into Force.
Norfolk ..	30s.	54 and 48	—	18 years.	20th May.
Northants	30s.	54 „ 48	8½d. and 10d.	18 „	27th „
Bucks ..	30s.	54 „ 48	—	18 „	8th July.
Berks ..	30s.	54 „ 48	8½d. and 10d.	18 „	„
Cambs, Hunts, and Beds	30s.	54 „ 48	8½d. „ 10d.	18 „	„
Essex ..	30s.	54 „ 48	8½d. „ 10d.	18-21 „	„
	32s.	—	9d. „ 11d.	21 „	—
Suffolk ..	30s.	54 „ 48	8½d. „ 10d.	18 „	8th July.
Oxford ..	30s.	52	8½d. „ 10d. (8½d. on Sundays for cattlemen, etc.)	18 „	„
Worcester	30s.	54 and 48	8½d. and 10d.	18 „	„
Devon ..	31s.	54 „ 48	—	18 „	„
Warwick..	30s.	54 „ 48	8½d. and 10d.	18 „	Not yet fixed.

Report of the Director-General of Food Production.

THE report of the Director-General of Food Production (England and Wales) for the period 19th February, 1917, to 1st June, 1918, has just been issued. Copies may be obtained through any bookseller or direct from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2., price 6*d.* net.

The Report is a comprehensive review of some 50 pages of the work of the Food Production Department since its inception in February, 1917. It opens with a general statement of the principal results of the Government's policy of increasing food production in England and Wales since the beginning of 1917, and then outlines the steps taken to achieve these results. The Report deals with a number of subjects, including drainage, game, soldier and other labour, the Women's Land Army, motor tractors, horse-drawn implements, supplies of agricultural commodities, seed testing and horticulture. Much of the information has already been published in this *Journal*, chiefly in the form of Official Notices and Circulars.

Produce of Crops in England and Wales, 1917.

PART II. of the Agricultural Statistics for the year 1917 (Cd. 9089, 1918, price 2*d.*) has been recently published by the Board, and gives returns of the produce of crops for England and Wales in 1917, with summaries for the United Kingdom. An interesting feature is the statement of the total output of the main farm crops in the United Kingdom during the four years from 1914 to 1917, and the increased contribution of home agriculture to the food supply for the year under review. The active intervention of the State to increase home production was only partially operative in the harvest of 1917; the full effects will become more apparent in the harvest of the present year.

Harvest Weather Forecasts.

THE Meteorological Office will, as in past years, but subject to certain restrictions, supply forecasts of weather by telegraph to persons desirous of receiving them, upon payment of a registration fee of 1*s.* and the cost of the telegrams, computed at 9*d.* per day. The supply of forecasts will continue until 30th September. The forecasts are drawn up each week-day at 4.30 p.m., and refer to the probable weather during the 15 hours from 6.0 a.m. to 9.0 p.m. on the next day. The addition of a "further outlook" and the issue of notifications in connection with spells of settled weather are suspended during the War.

Applications for the forecasts should be sent to the Director Meteorological Office, South Kensington, London, S.W. 7, with a cheque or postal order payable to the Meteorological Committee, to cover the cost of the telegrams for the period, which should not be less than six consecutive days, during which the forecasts are to be sent.

THE following Notice was issued by the Board on the 27th June :— The Board of Agriculture and Fisheries have awarded the Fream Memorial Prize for 1918 to Mr. Leonard C. Robinson, a student of the Harper Adams Agricultural College, Newport Salop, who took the highest marks at this year's examination for the National Diploma in Agriculture.

Fream Memorial Prize.

THE ollowing announcement was made by the Board on 14th June :—The President of the Board of Agriculture and Fisheries has appointed a Committee to consider and report how Government stores which may become available after the close of the War can best be utilised for agricultural and horticultural purposes ; and what methods of purchase by farmers and others should be adopted.

Use of Government Stores after the War.

The Committee will be constituted as follows :—

The Earl Grey.	Mr. John W. B. Pease, J.P.
M. J. S. Gibbons.	Captain Sir Beville Stanier, Bt., M.P.
Mr. W. R. Hopkinson.	Mr. Robert Stephenson.
Dr. F. Keeble, O.B.E., F.R.S.	Mr. Nigel Walker.
Mr. Douglas Newton.	Major the Hon. Edward F. L. Wood, M.P.

The Secretary of the Committee is Mr. E. G. Haygarth Brown, of the Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

THE following is a list of Retail and Wholesale Maximum Prices of certain agricultural commodities fixed by the Food Controller (extracted from recent issues of the *National Food Journal*) :—

Maximum Retail and Wholesale Prices.

RETAIL MAXIMUM PRICES.

Butter, a rate not exceeding actual cost as defined by the Order to the retailer by	2½*d*. per lb.
Government Butter	2*s*. 4*d*. ,,
Cheese, an addition to actual cost to the retailer as defined by the Order, not exceeding	2½*d*. per lb.
Government Cheese	1*s*. 4*d*. ,,
Damaged Grain, Seeds, and Pulse—	
For quantities not exceeding 7½ qr., add to traders' prices	4*s*. per qr.
For quantities of less than half a qr.	8*s*. ,,
Milk (Summer prices, unless varied by local Food Control Committees, subject to the sanction of the Food Controller)—	
June and July	2*s*. 4*d*. per Imp. gal.
August and September	2*s*. 8*d*. ,, ,,
(These prices do not apply to Ireland.)	
Potatoes, Early (1918 Crop)—	
(Imported and Home-Grown.)	
From June 16–30	3*d*. per lb.
,, July 1–15	2½*d*. ,,
,, ,, 16–31	2*d*. ,,

Potatoes: Ware (1917 Crop)—

Sold by grower, quantities less than 1 cwt. .. .. 1*d.* per lb.
Sold by retailer, the following scale :—

Retailer's Buying Price per Cwt.	Highest Authorised Retail Selling Price over the Counter. Per Stone of 14 lb. for Lots of 14 lb. or more.	Per Half Stone for Lots of 7 lb. or more, but less than 14 lb.	Per lb. for Lots of less than Half Stone.
	s. d.	s. d.	s. d.
Any price up to and including 3*s.* 3*d.*	0 7	0 3½	0 0½
Exceeding—			
3*s.* 3*d.* but not exceeding 3*s.* 7*d.*	0 7½	0 4	0 0¾
3*s.* 7*d.* ,, ,, 3*s.* 11*d.*	0 8		
3*s.* 11*d.* ,, ,, 4*s.* 2*d.*	0 8½	0 4½	
4*s.* 2*d.* ,, ,, 4*s.* 6*d.*	0 9		
4*s.* 6*d.* ,, ,, 4*s.* 9*d.*	0 9½	0 5	
4*s.* 9*d.* ,, ,, 5*s.* 1*d.*	0 10		
5*s.* 1*d.* ,, ,, 5*s.* 4*d.*	0 10½	0 5½	0 1
5*s.* 4*d.* ,, ,, 5*s.* 8*d.*	0 11		
5*s.* 8*d.* ,, ,, 5*s.* 11*d.*	0 11½	0 6	
5*s.* 11*d.* ,, ,, 6*s.* 3*d.*	1 0		
6*s.* 3*d.* ,, ,, 6*s.* 7*d.*	1 0½	0 6½	
6*s.* 7*d.* ,, ,, 6*s.* 11*d.*	1 1		
6*s.* 11*d.* ,, ,, 7*s.* 2*d.*	1 1½	0 7	
7*s.* 2*d.* ,, ,, 7*s.* 6*d.*	1 2		
7*s.* 6*d.* ,, ,, 7*s.* 10*d.*	1 2½	0 7½	0 1¼
7*s.* 10*d.* ,, ,, 8*s.* 1*d.*	1 3		
8*s.* 1*d.* ,, ,, 8*s.* 5*d.*	1 3½	0 8	
8*s.* 5*d.* ,, ,, 8*s.* 8*d.*	1 4		
8*s.* 8*d.* ,, ,, 9*s.* 0*d.*	1 4½	0 8½	
9*s.* 0*d.* ,, ,, 9*s.* 4*d.*	1 5		
9*s.* 4*d.* ,, ,, 9*s.* 8*d.*	1 5½	0 9	0 1½
9*s.* 8*d.* ,, ,, 10*s.* 0*d.*	1 6		
10*s.* 0*d.*	1 6½	0 9½	

Poultry Mixtures or Horse Corn Mixtures—

Profits permitted on cost price :—

More than 6 cwt.	1*s.* per cwt.
Less than 6 cwt. and not less than 3 cwt. ..	3*s.* ,,
Less than 3 cwt. and not less than ½ cwt. ..	4*s.* ,,
Less than ½ cwt.	½*d.* per lb.

Horse Chaff Mixtures—

1 ton or more	1*s.* per cwt.
Less than 1 ton and not less than 5 cwt. ..	2*s.* ,,
Less than 5 cwt. and not less than ½ cwt. ..	3*s.* ,,
Less than ½ cwt.	1*s.* per 14 lb.

Rabbits, Wild—

Including pelt or skin	2*s.*
Without the skin	1*s.* 9*d.*
For part, skinned and cleaned	10*d.* per lb.

WHOLESALE MAXIMUM PRICES.

Damaged Grain, Seeds, and Pulse—

Imported feed wheat	72s. per 480 lb.
Damaged imported wheat	65s. ,, ,,
Damaged imported rye	65s. ,, ,,
Damaged imported maize	65s. ,, ,,
Damaged imported and home-grown pulse and seeds (other than oil seeds) used for feeding purposes	65s. ,, ,,
Damaged imported barley	55s. ,, 448 lb.
Damaged imported oats	41s. ,, 336 ,,

Grain.—Home-Grown of 1917 crop—

Date of Delivery.	Wheat and Rye, per qr. of 504 lb.	Oats, per qr. of 336 lb.	Barley, per qr. of 448 lb.
	s. d.	s. d.	s. d.
January, 1918	74 6	45 3	62 9
February or March, 1918	75 6	46 3	62 9
April or May, 1918	76 9	47 3	62 9
On or after 1st June, 1918	77 9	48 6	62 9

Oats, for human food	*add* 3s. per qr.
Wheat and Rye, unfit for milling, or tailings and dressings	*deduct* 7s. per qr.
Barley, unfit for milling, or tailings and dressings	*deduct* 7s. 9d. per qr.
Oats, improperly cleaned, or tailings and dressings	*deduct* 5s. per qr.
Grain, bought by flour miller from recognised dealer, not producer	*add* 1s. per qr.
Grain, bought by non-miller from recognised dealer, not producer	*add* 2s. to 8s. per qr.

Milk (Summer Prices)—

PRODUCERS' PRICES.

	Per Imp. Gal. *England and Wales.*	*Scotland.*
	s. d.	s. d.
July	1 6	1 4
August	1 7	1 6
September..	1 7	1 8

WHOLESALE DEALERS' PRICES.

	England, Wales and Scotland Per Imp. Gal. *Delivery to Buyer's Railway Station.**	*Delivery to Buyer's Premises.*
	s. d.	s. d.
June 1st—8th	1 2	1 4½
,, 9th—30th..	1 6	1 8½
July	1 6	1 8½
August	1 10	2 0½
September..	1 10	2 0½

* In addition to railway charges paid by the seller for transport from the seller's station to buyer's station.

(These prices do not apply to Ireland.)

	Per ton. £ s. d.
Cattle Foods—	
Home Manufactured Cakes and Meals—	
Linseed cake containing not less than 8 per cent. oil ..	19 0 0
Cotton seed cake	14 10 0
Undecorticated ground nut cake	17 5 0
Semi-decorticated ground nut cake	18 2 6
Decorticated ground nut cake	19 0 0
Palm kernel cake	13 15 0
Rape cake	14 0 0
Copra cake	16 5 0
Sesame cake	18 10 0
Soya cake	19 0 0
Extracted palm kernel meal	13 10 0
Extracted rape meal	14 0 0
Extracted soya meal	18 15 0
Imported Cakes and Meals—	
North American linseed cake	19 5 0
Argentine linseed cake	19 15 0
Canadian linseed cake	19 10 0
Australian linseed cake	19 10 0
Spanish and Portuguese linseed cake	19 10 0
Egyptian cotton seed cake	15 0 0
Decorticated cotton seed meal	19 15 0
Decorticated cotton seed cake	19 15 0
Repressed cotton cake	20 15 0
Semi-decorticated cotton cake	17 10 0
Copra cake	17 10 0
Palm kernel cake	15 0 0
Rangoon rice meal	16 10 0
Italian rice meal	14 10 0
Canadian rice meal	17 0 0
Egyptian rice meal	17 0 0
Gluten feed	17 5 0
Maize meal cake	17 5 0
Compound Cakes and Meals (made from two or more ingredients when no oil is expressed in the process of manufacture)—	
Cakes and meals containing not less than 7 per cent. oil and not less than 20 per cent. albuminoids ..	17 5 0
Cakes and meals containing not less than 6 per cent. oil and not less than 20 per cent. albuminoids	17 0 0
Cakes and meals containing not less than 6 per cent. oil and not less than 17 per cent. albuminoids.. ..	16 17 6
Millers' Offals—	
Flour millers' offals of all kinds	13 0 0
Fine barley dust	17 0 0
Coarse barley dust	8 0 0
Oat dust	6 0 0
Oat husks	3 0 0
Oat husk meal	5 0 0
Miscellaneous—	
Malt culms	13 5 0
Kiln dust	11 0 0
Dried distillers' grains	15 5 0
Dried brewers' ale grains	14 5 0
Dried brewers' porter and mixed grains	14 0 0
	Per usual trade quarter £ s. d.
Wet brewers' ale and distillers' grains for October—April delivery	0 8 4
Wet brewers' porter and mixed grains for October—April delivery	0 7 10
Wet brewers' ale and distillers' grains for May—September delivery	0 7 4
Wet brewers' porter and mixed grains for May—September delivery	0 6 10

Cattle Grading—

BULLS, BULLOCKS AND HEIFERS.

		Per cwt.
1st Grade,	56 per cent. and over	75s.
2nd ,,	52 per cent. to 56 per cent.	70s.
3rd ,,	48 per cent. to 52 per cent.	65s.
4th ,,	under 48 per cent.	55s.

COWS.

		Per cwt.
1st Grade,	52 per cent. and over	70s.
2nd ,,	46 per cent. up to 52 per cent.	62s.
3rd ,,	42 per cent. up to 46 per cent.	53s.
4th ,,	under 42 per cent.	45s.

Horse Mixtures and Poultry Mixtures—

Profits permitted on cost price .. .. 30s. per ton.

Onions, British—

If sold by grower	£15 per ton.
If sold other than by grower	£19 ,,

Pigs—

Live weight	21s. per 20 lb.
Dead weight (offal excluded)	26s. 9d. ,,
Dead weight (offals included)	28s. ,,

(No pig may be sold for slaughter weighing less than 112 lb. live weight.)

Potatoes, Ware (1917 Crop)—

For potatoes delivered prior to 15th April	£6 10s. per ton.
For potatoes delivered between 15th April, 1918, and 14th May, 1918, inclusive	£7 ,,
For potatoes delivered after 14th May, 1918	£7 10s. ,,
Wholesalers' prices: average profit during any week not to exceed	7s. 6d. ,,

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Prosecutions of Farmers, etc., under Statutory Rules and Orders.

Mr. Philip Savill, The Woodlands, Chigwell, a member of the Stratford (London) Bench, was fined £5 for aiding and abetting William Salter, his coachman (fined 40s.), in feeding a horse with cereals.

Mr. Alfred Gravely Howard, Burnt House, Chigwell, a J.P. for West Ham, was fined £5, and George James White, his coachman, £2, in respect of the feeding of a horse on "flaked horse food," which contained crushed oats.

Belvoir.—Fines amounting, with costs, to £45 were imposed on Arthur Hoy Hickson, Bottesford, for extracting less than the prescribed percentage of flour from wheat.

Haywards Heath.—S. Caffyn, of Cuckfield, was charged with failing to send in monthly returns for 20 weeks. Mr. C. H. Hornby, of the Ministry of Food, pointed out that, when millers did not forward these returns, it was impossible to know whether the regulation flour was being made. The Bench imposed fines amounting to £21, with 10 guineas costs. (*National Food Journal*, 22nd May, 1918.)

Scarborough.—Messrs. G. Turnbull and Sons, Allerston, were charged with failing to obtain the minimum percentage of flour in respect of four monthly periods. Mr. C. H. Hornby, Ministry of Food, pointed out that, an inspector having considered the flour they were using much too white, frequent warnings had been given. The wastage of bread over the period represented 3,397 four-pound loaves. Mr. Hart, defending, urged that they had done everything to comply with the Orders, and that the offence was purely technical. Fines amounting to £60 were imposed, with £30 costs.

Whitby.—Messrs. H. B. Bell and Son, Ruswarp, were fined £22 for a similar offence, with 20 guineas costs.

Wimborne.—J. F. Hatchard, Walford Mills, was charged on 31 summonses with failure to make monthly and weekly returns as required by the Flour Mills Order. Fines amounting to £31, with £15 costs, were imposed.

Blackwood (Mon.).—Richard Richards, farmer, and Richard Williams, wholesale meat buyer, were fined £50 each, with 10 guineas costs, on a sale of ungraded cattle outside a market. (*National Food Journal*, 12th June, 1918.)

Brentwood.—Thomas Knight, South Weald, was mulcted in the sum of £30 10*s.*, fine and costs, for selling unmarketed sheep for slaughter and Frank May, who had slaughtered them, £15 5*s.*

Lincoln.—Frederick Chapman, 25, Dale Street, and Richard Parker, were fined, respectively, £10 and £5 for feeding rock cakes to pigs. About 7 stones of these cakes, which the executive officer and a police sergeant tasted without ill effects, were found in two swill tubs. They had been bought from an Army canteen. (*National Food Journal*, 26th June, 1918.)

Pontefract.—Arthur Stubbs, farmer, and Thomas Meays, butcher, were fined £20 each for selling and buying a calf outside a market. (*National Food Journal*, 10th July, 1918.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for June, 1918, issued by the International Institute of Agriculture, contains estimates of the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Canada, United States, British India, and Tunis is estimated at 203,684,000 qr. this year, against 158,803,000 qr. last year, or an increase of 28·3 per cent. *Rye.*—The estimated production in Canada and the United States is placed at 10,116,000 qr. in 1918, against 7,465,000 qr. in 1917, or an increase of 35·5 per cent. *Barley.*—The production in Canada, United States, and Tunis is estimated to amount to 37,274,000 qr. this year, against 32,666,000 qr. last year, or an increase of 14·1 per cent. *Oats.*—It is estimated that the total yield in Canada, United States, and Tunis, will amount to 208,079,000 qr. in 1918, or an increase of 0·5 per cent. compared with 1917, when it amounted to 207,068,000 qr.

The condition of the crops in other countries on the 1st June, 1918 (100 being taken to represent the average yield in the last 10 years), is given as follows :—*Wheat.*—Scotland, 110 ; Ireland, 115 ; Sweden, 103 ; Switzerland, 94. *Rye.*—Sweden, 107 ; Switzerland, 100. *Barley.*—Sweden, 103 ; Switzerland, 100. *Oats.*—Sweden, 98 ; Switzerland, 94.

Netherlands.—According to a report received from H.M. Consul-General at Rotterdam on the state of agricultural produce on 14th June, the weather has been very dry and many crops have lost condition in consequence. The general prospects throughout the country are as follows : (100 =excellent ; 90 =very good ; 70 =good ; 60 =fairly good ; 50 =moderate ; 40 =fairly bad ; 30 =bad ; 10 =failure. The figures in brackets give the condition of the crops on 20th April) :—Winter wheat, 69·8 (72) ; summer wheat, 67·7 ; winter rye, 70·1 (70) ; winter barley, 67·8 (67) ; summer barley, 63·7 ; oats, 58·5 ; potatoes, 68·6. The fruit prospects are not promising. Insect pests have been very troublesome, owing chiefly to the dry, sunny weather, and night frosts and drought have done harm.

France.—According to the official report of the Ministry of Agriculture on 1st June the weather during the first fortnight of May was wet and cold, but during the rest of the month warm and dry, except for occasional thunderstorms, hail, and floods in some parts. The conditions during the latter half of the month were in general favourable for agricultural work, and potato and artichoke planting, and maize, buckwheat, bean, and beetroot sowing, were carried on satisfactorily. Growing crops recovered from the check they had received earlier, and their condition greatly improved. Cereals on the whole look well, in some cases very well. Hay-making has begun in some districts, with the prospect in general of a good yield. Potatoes, which suffered from excess of moisture, have been replanted where necessary, and the crop now presents a satisfactory appearance. Fruit, especially stone fruits, suffered seriously from April frosts, and in the cider making districts the crops of apples and pears will be very scanty.

A later report, dated 1st July, states that the dry weather of the latter half of May continued through June, and spring barley and oats and most root crops suffered somewhat from want of moisture. Autumn cereals, except on very light soils, were not injured and present a very promising appearance. The yield of hay, though rather light, is of good quality. (*Journal Officiel*, 1st July, 1918.)

Canada.—The High Commissioner for Canada, in a report dated the 17th June, states that the estimated yield of this years' grain crops is as follows :—wheat, 313,576,000 bush. ; oats, 494,604,000 bush. ; barley, 65,285,000 bush. ; and rye, 4,000,000 bush.

United States.—According to a report issued by the Statistical Bureau of the Department of Agriculture the condition of the crops on 1st July was as follows (1917 figures in brackets for comparison) : Winter wheat, 79·5 (75·9) ; spring wheat, 86·1 (83·6) ; barley, 84·7 (85·4) ; oats, 85·5 (89·4) ; winter rye, 80·8 (79·4) ; maize, 87·1 (81·1). The yield of winter wheat is now estimated at 557,000,000 bush. as compared with 418,000,000 bush. last year ; spring wheat 334,000,000 bush. against 232,000,000 bush ; barley 230,000,000 bush against 209,000,000 bush ; oats, 1,437,000,000 bush. against 1,587,000,000 bush. ; and winter rye, 82,000,000 bush. against 60,000,000 bush in 1917. The area under maize is estimated at 113,835,000 acres as compared with 121,000,000 acres last year, and the yield at 3,160,000,000 bush. against 3,159,000,000 bush. last year. The amount

of old wheat in farmers' hands is estimated at 8,000,000 bush. compared with 15,720,000 bush. a year ago. (*Broomhall's Corn Trade News*, 10th July.)

Egypt.—The Bulletin of the Ministry of Agriculture, dated 30th April, gives the condition of the wheat crop as 98 to 101 per cent. of average; barley, 101 to 105 per cent.; beans, 102 to 104 per cent. (*Broomhall's Corn Trade News*, 18th June, 1918.)

Agricultural Conditions in England and Wales on 1st July.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st July, state that the weather has been generally cold and dry, and the lack of mositure has checked growth, particularly on light soils. Wheat promises to be the best of the cereal crops; it has made good progress and is now coming well into ear. In some districts spring wheat has snffered from the drought. The yield in nearly all districts is expected to be over the average. Barley, for the most part, looks well, but has suffered from the absence of rain, particularly on sandy soils, and is not expected to give an average yield. Oats are not so promising, and have suffered from the drought and wireworm, and the yield is likely to be below average. Straw is generally short. Beans and peas are satisfactory, and should give an average crop.

Potatoes have come up well, and are strong and healthy, though the growth has been retarded by the cold weather and the lack of rain. There is very little mention of disease, and the yield is expected to be about average.

Turnips and swedes have suffered from the dry weather and attacks of "fly." A good deal has had to be re-sown, and germination is backward in these areas. Mangolds have also suffered from the same causes, and the yield is likely to be substantially below the average.

The hay harvest is generally earlier than usual, and much has been secured under favourable circumstances and in good condition. The yield of seeds hay is likely to be about average, but that of meadow hay slightly under average.

Grass has been fairly plentiful, but pastures are now getting bare and rain is badly required. Stock are in a healthy condition and for the most part doing well. In some districts the supply of milk is falling off.

The cold nights and lack of rain have retarded the growth of hops, and the bine is very backward. Attacks of aphis have been very prevalent, and washing has been general. The yield in Kent is only expected to be about three-quarters of a crop, and in the western counties but little more than half the average.

All classes of orchard fruit have done badly owing to early frost and insect attacks, and in many districts the crops are failures. The yield of apples, plums, and pears is likely to be very small, but cherries promise a little better, although much below the average. The yield of small fruit of all kinds is also below average.

The supply of labour is generally deficient, but the shortage has to some extent been relieved by the employment of women, soldiers, and German prisoners, while the fine weather has enabled the hay harvest to be proceeded with rapidly.

Summarizing the returns, and expressing an average crop by 100, the condition of the crops on the 1st July indicated probable yields per acre which may be denoted by the following percentages :—Wheat, 103 ; barley, 98 ; oats, 95 ; beans, 101 ; peas, 99 ; potatoes, 100 ; mangolds, 93 ; seeds hay, 99 ; meadow hay, 97 ; hops, 70.

THE following local summaries give further details regarding agricultural labour in the different districts of England and Wales :—

Agricultural Labour in England and Wales during June.

Northumberland, Durham, Cumberland, and Westmorland.—Labour is still very scarce in some districts, but in others sufficient, so far, thanks partly to the easy hay harvest.

Lancashire and Cheshire.—The supply of labour is still very deficient.

Yorkshire.—The deficient supply of labour is causing farmers a good deal of anxiety, and work proceeds slowly. Good horsemen are scarce, and extra labour is needed for hoeing turnips. Women have helped greatly, and where soldiers are also available work has been kept in hand.

Shropshire and Stafford.—The supply of labour is still deficient, very little casual labour being obtainable for the hay harvest and hoeing.

Derby, Nottingham, Leicester, and Rutland.—The usual labour is increasingly deficient, but the dry weather and slow rate of growth have made it possible for the work to be kept fairly well in hand by substitutes.

Lincoln and Norfolk.—Very little of the usual labour is now available, but work has been so far kept in hand by substitutes.

Suffolk, Cambridge, and Huntingdon.—The normal male labour is everywhere increasingly deficient.

Bedford, Northampton, and Warwick.—The usual labour is deficient, but the work has been mostly done by substitutes and is not behindhand. Wages still tend to increase.

Buckingham, Oxford, and Berkshire.—Labour is scarce, but so far has been sufficient, especially as so little fruit picking has been done.

Worcester, Hereford, and Gloucester.—Labour is deficient in most districts, but with the help of soldiers and women and prisoners of war the work is being got through, though sometimes with difficulty.

Cornwall, Devon, and Somerset.—Labour is generally deficient, but the fine weather has enabled the work to be accomplished with the help of soldiers and women.

Dorset, Wiltshire, and Hampshire.—Very little of the usual labour is now available, the work, for the most part, being done by substitutes.

Surrey, Kent, and Sussex.—The usual labour is increasingly deficient, and wages are high, but, in general, the work has been kept in hand so far with the help of substitutes.

Essex, Hertford, and Middlesex.—The supply of labour is deficient, but the general situation appears about the same as last month.

North Wales.—In most districts the supply of labour is very scarce, but in others there is sufficient with which to carry on.

Mid Wales.—The usual supply of male labour is increasingly deficient in all parts of the division.

South Wales.—The supply of labour, especially casual, is very scarce in most districts.

THE following statement shows that according to the information in the possession of the Board on 1st July, 1918, certain diseases of animals existed in the countries specified :—

Animal Diseases on the Continent.

Austria (*on the 29th May*) Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (*month of April*).—Anthrax, Swine Erysipelas.

France (*for the period 19th May—1st June*).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine Fever.

Holland (*month of April*).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (*on the 29th May*).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (*for the period 3rd—9th June*).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,253 outbreaks), Glanders, Rabies, Sheep-scab, Swine Fever.

Norway (*month of May*).—Anthrax.

Spain (*month of January*).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Tuberculosis.

Sweden (*month of May*).—Anthrax, Black-leg, Swine Erysipelas, Swine Fever.

Switzerland (*for the period 3rd—9th June*).—Anthrax, Black-leg, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Germany, Montenegro, Rumania, Russia, Serbia.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of June, 1916, 1917, and 1918

—	Wheat.						Barley.						Oats.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d
London ...	50	0	79	9	74	8	51	0	66	2	52	9	33	5	55	4	—	
Norwich ...	49	6	77	11	74	1	48	10	65	2	57	7	31	4	55	2	45	
Peterborough	47	9	78	1	74	6	48	8	65	1	56	7	31	8	55	1	—	
Lincoln ...	50	3	77	8	74	1	49	9	68	0	56	3	32	4	54	8	—	
Doncaster ...	50	1	77	11	73	8	—		—		—		31	7	54	11	—	
Salisbury ...	49	4	78	2	73	6	50	1	65	8	56	3	31	6	55	1	45	

STATEMENT showing the Average Price of **British Corn,** pe Quarter (Imperial Measure), for the Quarter ending Mic summer, *1918, pursuant to the Corn Returns Act, 1882.*

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperia Bushels, computed from the Returns received under the Cor Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.			BARLEY.			OATS.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Jan. 5...	55 8	76 0	71 2	47 8	66 4	58 0	31 5	47 1	45 5
,, 12...	56 7	75 8	71 2	48 6	65 7	58 2	31 11	47 2	46 9
,, 19...	57 2	75 8	71 3	49 6	64 9	58 1	32 6	47 4	47 9
,, 26...	58 0	75 10	71 1	51 0	64 5	58 7	32 11	47 8	48 2
Feb. 2...	58 3	75 10	71 2	52 5	64 0	58 10	32 4	47 3	50 2
,, 9...	57 6	76 0	72 0	52 10	63 5	59 0	32 2	46 11	50 6
,, 16...	56 11	76 3	72 3	53 6	63 8	58 11	31 9	47 3	52 0
,, 23...	58 2	76 9	72 2	54 2	63 9	58 9	32 2	47 8	52 3
Mar. 2...	59 4	77 4	72 2	55 7	64 0	57 9	32 4	48 0	52 0
,, 9...	58 2	78 0	72 3	55 6	63 7	58 5	32 3	48 7	52 2
,, 16...	57 9	78 10	72 4	55 4	64 1	56 10	31 10	49 4	51 0
,, 23...	55 11	80 3	72 3	54 6	65 6	56 9	31 4	50 4	50 3
,, 30...	53 6	81 5	72 4	53 8	71 10	56 7	30 5	51 10	48 10
Apl. 6...	51 8	84 4	72 11	53 7	69 11	56 7	30 1	55 1	49 10
,, 13...	53 2	85 2	73 3	53 1	71 10	56 6	30 7	57 2	47 2
,, 20...	55 3	84 10	73 3	52 10	70 6	56 6	31 8	59 8	47 0
,, 27...	56 3	81 1	73 3	53 5	69 5	56 10	32 4	58 6	46 8
May 4...	55 7	77 7	73 5	53 1	64 4	56 5	32 10	54 9	47 4
,, 11...	55 5	78 0	73 5	53 5	64 11	56 6	33 1	55 2	47 6
,, 18...	55 0	77 11	73 4	52 10	64 10	56 6	33 0	55 2	46 4
,, 25...	54 7	78 0	73 3	52 9	64 9	56 6	33 4	54 11	47 8
June 1...	53 3	78 0	73 8	53 9	65 11	60 0	33 3	54 11	44 9
,, 8...	51 2	78 0	73 11	52 8	67 7	59 2	32 7	55 0	45 5
,, 15...	48 10	78 2	74 3	50 9	75 6	57 9	32 1	55 1	45 7
,, 22...	47 6	78 1	74 4	49 10	75 0	58 5	31 3	55 2	47 8
,, 29...	46 3	78 3	74 4	49 1	73 11	57 10	30 10	55 1	46 4
July 6...	46 3	78 1	74 4	45 6	69 5	61 7	30 8	55 2	46 10
,, 13...	48 11	78 2		47 5	70 10		31 6	55 1	
,, 20...	51 6	78 3		48 8	72 1		32 3	55 2	
,, 27...	53 5	78 3		47 2	65 7		32 5	55 2	
Aug. 3...	55 1	78 2		46 1	73 6		32 9	55 0	
,, 10...	56 7	78 4		46 11	76 1		31 2	55 0	
,, 17...	58 1	78 7		48 0	68 11		30 8	55 6	
,, 24...	59 0	76 7		47 1	70 7		31 6	54 7	
,, 31...	59 4	72 1		48 5	60 4		30 5	49 0	
Sept. 7...	59 3	71 6		51 7	59 3		31 1	46 7	
,, 14...	59 11	70 7		52 6	57 2		30 9	45 0	
,, 21...	59 4	70 8		53 3	56 10		30 9	45 8	
,, 28...	58 10	70 6		54 1	58 5		31 1	44 7	
Oct. 5...	59 2	70 8		54 5	57 9		30 9	44 9	
,, 12...	59 7	71 0		53 10	58 5		31 6	44 5	
,, 19...	60 9	70 8		53 8	59 3		31 11	44 1	
,, 26...	62 10	70 10		54 6	60 1		32 10	43 0	
Nov. 2...	66 7	70 4		56 2	59 11		34 0	42 4	
,, 9...	69 8	70 3		58 0	60 2		35 8	42 11	
,, 16...	70 9	70 3		59 8	60 2		37 8	43 0	
,, 23...	70 8	70 2		61 8	59 9		39 7	43 1	
,, 30...	71 3	70 2		63 1	59 3		41 4	44 6	
Dec. 7...	72 1	70 7		65 6	58 7		44 1	43 5	
,, 14...	73 2	71 2		66 5	58 0		45 10	43 6	
,, 21...	74 8	71 1		67 3	57 7		46 5	44 2	
,, 28...	75 10	71 1		67 5	57 7		47 4	44 10	

NOTE.—Returns of purchases by weight or weighed measure are converted Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oat 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES OF LIVE STOCK IN ENGLAND AND WALES in June and May, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	June.		May.	
	First Grade.	Second Grade.	First Grade.	Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	75 2	70 6	75 2	70 0
Herefords	75 4	70 0	75 4	70 1
Shorthorns	75 0	69 11	75 2	70 0
Devons	75 2	70 1	75 2	70 0
Welsh Runts	75 0	—	—	—
Fat Cows	69 11	62 1	70 0	62 2
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d.
Veal Calves	16½	14¼	17	14¼
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	49 6	38 2	50 2	38 12
,, —Calvers ...	45 13	37 1	45 7	35 19
Other Breeds—In Milk ...	44 3	35 11	50 3	36 16
,, —Calvers ...	32 10	27 0	37 0	30 5
Calves for Rearing	4 14	3 8	4 8	3 5
Store Cattle :—				
Shorthorns—Yearlings ...	18 8	15 7	18 4	15 6
,, —Two-year-olds...	28 4	23 8	28 4	23 7
,, —Three-year-olds	37 8	33 2	38 5	32 9
Herefords—Two-year-olds...	29 14	26 13	32 5	27 10
Devons— ,,	30 13	26 4	31 11	27 12
Welsh Runts— ,,	26 6	22 14	27 10	23 11
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	77 5	61 9	81 5	68 8
Store Pigs :—				
8 to 12 weeks old	64 10	49 8	67 9	51 4
12 to 16 ,, ,, ...	98 3	76 6	101 1	82 3

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during June made prices equivalent to an additional 1*d*. per lb. of the carcass weight for Downs, ¾*d*. for Longwools, 1¼*d*. for Cheviots, Blackfaced and Welsh, and 1¼*d*. for Cross-breds, and during [illegible] for Longwools, 1¼*d*. for Cheviots.

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in June, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	114 6	114 6	—	114 6	114 6
	2nd	114 6	114 6	—	114 6	114 6
Cow and Bull	1st	114 6	114 6	114 6	114 6	114 6
	2nd	114 6	114 6	99 6	107 6	104 6
Irish : Port Killed ...	1st	—	—	114 6	—	114 6
	2nd	—	—	110 6	—	114 6
Argentine Frozen—						
Hind Quarters ...	1st	129 6	129 6	129 6	129 6	129 6
Fore ,, ...	1st	99 0	99 0	99 0	99 0	99 0
Argentine Chilled—						
Hind Quarters ...	1 t	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
Canadian Frozen—						
Hind Quarters ...	1st	—	129 6	—	129 6	—
Fore ,, ...	1st	—	99 0	—	99 0	—
VEAL :—						
British	1st	—	—	112 0	114 6	112 0
	2nd	—	114 6	93 6	98 0	99 0
Foreign	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	121 6	121 6	121 6	121 6	121 6
	2nd	121 6	121 6	121 6	121 6	121 6
English	1st	121 6	121 6	—	121 6	121 6
	2nd	121 6	121 6	—	121 6	121 6
Irish : Port Killed ...	1st	—	—	121 6	—	121 6
	2nd	—	—	121 6	—	121 6
Argentine Frozen ..	1st	121 6	121 6	121 6	121 6	121 6
New Zealand ,, ...	1st	—	121 6	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	121 6	121 6	121 6	—	121 6
	2nd	121 6	121 6	121 6	—	121 6
New Zealand	1st	121 6	121 6	121 6	121 6	121 6
Australian...	1st	—	—	—	—	—
Argentine	1st	121 6	121 6	121 6	121 6	121 6
PORK :—						
British	1st	—	149 6	149 6	149 6	—
	2nd	—	149 6	—	149 6	—
Frozen	1st	—	149 6	—	149 6	...

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in June, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First *Quality.*	Second *Quality.*	First *Quality.*	Second *Quality.*	First *Quality.*	Second *Quality.*
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	172 0	171 6	—	—	173 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 6	—	185 6	—
			per cwt.		per cwt.	
Canadian	130 6	—	130 6	—	130 6	—
BACON :—						
Irish (Green)	—	—	197 6	—	—	—
Canadian (Green sides)	177 6	—	177 0	—	178 0	175 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	170 6	—	170 0	—	171 0	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	41 8	39 2
Irish	38 0	—	38 0	37 0	40 0	38 0
Egyptian	—	—	—	—	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	—	—	—	—	170 0	160 0
Edward VII.	—	—	137 6	127 6	171 6	162 6
Up-to-Date	170 6	160 0	131 0	122 6	—	—
HAY :—						
Clover	—	—	—	—	157 6	150 0
Meadow	—	—	—	—	157 6	150 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

Disease.	June.		Six Months ended June.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	15	25	143	293
Animals attacked	17	32	161	336
Glanders (including Farcy):—				
Outbreaks	5	3	19	14
Animals attacked	17	6	55	26
Parasitic Mange:—				
Outbreaks	427	196	2,999	1,584
Animals attacked	784	333	5,736	3,168
Sheep Scab:—				
Outbreaks	11	15	244	383
Swine Fever:—				
Outbreaks	224	284	719	1,412
Swine slaughtered as diseased or exposed to infection	93	138	260	609

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

Disease.	June.		Six Months ended June.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	1	1	2	3
Animals attacked	1	3	3	5
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange:—				
Outbreaks	9	5	76	28
Sheep-Scab:—				
Outbreaks	11	23	175	233
Swine Fever:—				
Outbreaks	4	17	11	141
Swine slaughtered as diseased or exposed to infection	4	76	31	931

The Weather in England during June.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 1st June:								
England, N.E. ...	56·6	+3·6	0·04	1	−10	1	10·1	+3·8
England, E.	55·5	+0·5	0·00	0	−10	0	10·9	+3·8
Midland Counties ...	57·5	+2·8	0·00	0	−12	0	9·3	+3·0
England, S.E. ...	56·6	+0·9	0·01	0	−10	1	11·9	+3·6
England, N.W. ...	55·9	+1·9	0·01	0	−14	1	11·1	+4·4
England, S.W. ...	57·5	+2·7	0·01	0	−11	1	11·8	+4·9
English Channel ...	57·3	+1·4	0·01	0	−12	1	11·8	+3·7
Week ending 8th June:								
England, N.E. ..	55·7	+1·9	0·16	4	−7	2	8·8	+2·7
England, E.	54·6	−1·2	0·01	0	−13	1	9·2	+2·5
Midland Counties ...	56·6	+0·7	0·10	3	−11	1	8·7	+2·6
England, S.E. ..	56·3	−0·5	0·01	0	−14	1	9·6	+2·7
England, N.W. ...	57·3	+2·3	0·50	13	+3	2	11·7	+4·8
England, S.W. ...	57·9	+1·8	0·10	3	−11	1	11·2	+4·4
English Channel ...	58·6	+1·8	0·03	1	−12	1	11·8	+4·5
Week ending 15th June:								
England, N.E. ...	54·5	+0·1	0·05	1	−9	1	6·7	+0·3
England, E.	56·3	+0·5	0·19	5	−7	2	7·2	+0·4
Midland Counties ...	55·0	−0·7	0·27	7	−3	3	6·5	+0·1
England, S.E. ...	56·4	−0·1	0·38	10	−0	3	6·5	−0·7
England, N.W. ...	53·6	+1·9	0·43	11	−1	3	5·2	−1·9
England, S.W. ..	54·6	−1·4	0·46	12	−2	3	7·5	+0·3
English Channel ...	56·4	−0·5	0·18	5	−3	4	7·5	−0·8
Week ending 22nd June:								
England, N.E. ...	52·7	−3·4	0·23	6	−8	4	5·2	−0·7
England, E.	54·3	−3·6	0·49	12	+1	5	6·3	−0·3
Midland Counties ...	53·2	−4·1	0·44	11	−3	5	4·2	−1·6
England, S.E. ...	55·0	−3·2	0·53	13	+2	3	6·2	−0·7
England, N.W. ...	52·3	−4·3	0·65	17	−1	6	2·7	−3·1
England, S.W. ...	53·7	−3·2	0·65	16	+2	3	5·1	−1·1
English Channel ...	54·8	−3·4	0·33	9	−3	3	7·0	−0·4
Week ending 29th June:								
England, N.E. ...	53·4	−4·3	0·14	4	−8	2	6·2	−0·1
England, E.	53·4	−6·3	0·31	8	−3	2	7·0	−0·4
Midland Counties ..	54·3	−4·8	0·10	3	−11	2	6·4	−0·2
England, S.E. ...	54·6	−5·4	0·09	2	−8	2	8·7	+0·9
England, N.W. ...	53·4	−4·5	0·16	4	−13	2	7·7	+1·4
England, S.W. ...	53·9	−4·5	0·03	1	−14	1	9·3	+2·3
English Channel ...	56·4	−3·0	0·07	2	−7	1	11·1	+2·5

* 1 inch = 25·4 millimetres.

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EDITORIAL NOTES.

Central Agricultural Advisory Council.

THE Central Agricultural Advisory Council, the President of which is the Right Hon. R. E. Prothero, M.V.O., M.P., President of the Board of Agriculture and Fisheries, is an amalgamation of the Agricultural Advisory Committees of the Ministry of Food and the Board of Agriculture, and consists of representatives chosen from the chief agricultural organisations of the United Kingdom, with the addition of members nominated by the Departments concerned. At its first meeting on the 16th July, Lord Selborne was elected Chairman, and Sir Charles Bathurst and Dr. Douglas, Vice-Chairmen.

The terms of reference for the Council were: "To advise the Ministers of the Board of Agriculture and the Ministry of Food on matters of policy involved in the control during the War of the prices, distribution and production of agricultural products." In his opening remarks the President pointed out that the members of the Council were there in two capacities: (1) as representatives of a great and important industry, and (2) as an assembly of farmers who as loyal patriotic subjects, were asked to be just not only to their own industry, but to all the other interests and industries of the vast host of inhabitants affected by their advice. He was sure that they would feel the serious responsibility which was entailed by their decision as advisers in the national interest. On his election as Chairman, Lord Selborne said that he accepted on condition that the Council be consulted by the four Departments concerned on proposals relating to agriculture before they had reached a point when reconsideration was impossible, or even had begun to come to a provisional decision, and by other Departments, such as the War Office, which dealt with agricultural products other than food, *e.g.*, wool and hay. A note of the proceedings of the first two meetings is given at p. 604.

Statement by the President.

SPECIAL attention is directed to the Report of the statement made by the President of the Board in the House of Commons, on 18th July (p. 521). In his statement, the President dealt generally with the work of the Board during the preceding 18 months, and showed that a good deal had been accomplished despite the many difficulties with which the Department had had to contend.

National Institute of Agricultural Botany.

AT a meeting at the Cannon Street Hotel, on 15th July, under the auspices of the Agricultural Seed Trades Association of the United Kingdom, Mr. Lawrence Weaver, C.B.E., Controller of Supplies, Food Production Department, announced that Sir Robert McAlpine and Sons had contributed to the endowment of the National Institute of Agriccultural Botany a sum of £10,000 in addition to £1,000 a year for five years, and five other gentlemen had given £1,000 each, while the Association of Corn and Agricultural Merchants and the Millers Association had also opened subscription lists for their members. At the close of the meeting it was announced that the Seed Trade had contributed over £10,500, which has since increased to £13,000. Mr. Weaver explained that none of the money subscribed would be used for building the Official Seed Testing Station. This would form part of the Institute, but its cost would be provided by the Board of Agriculture. The Trust Fund, so far, amounts to about £36,000 and it is hoped will reach £50,000.

Feeding Trials.

THE feeding trials conducted in England, Scotland, and Ireland, of which an account is given by Professor Wood on p. 549, show fairly clearly the differences in results when store cattle are fed with and without cake. At the present time when feeding stuffs are so scarce, farmers should pay special attention to the results of these experiments.

Forestry.

IN reply to a question put by Lord Selborne in the House of Lords on 8th August, Viscount Peel replied that the question of afforestation was referred by the War Cabinet to a Sub-Committee of Ministers who reported generally in favour of the proposals of the Forestry Sub-Committee of the Reconstruction Committee, and their Report has been accepted by His Majesty's Govern-

ment. Viscount Peel stated that a central authority for afforestation for the United Kingdom would be set up, and a policy of planting would be pursued with the least possible delay. (See also p. 524.)

Mange in Horses.

HORSE owners should take particular note of the statement as to parasitic mange which is given on p. 581. Evidence is fast accumulating that this disease is becoming very prevalent, and farmers should take every possible step to prevent their animals becoming affected. Should the disease be discovered, the remedies recommended should be immediately applied.

Co-operation in Agriculture.

ATTENTION is directed to the section of the Report of the Agricultural Policy Sub-Committee of the Reconstruction Committee which deals with the importance of agricultural organisation and co-operation. The Committee suggest that the outstanding feature of the agricultural industry is its isolation, and that in this age, when combination becomes daily more necessary in order that the small man may enjoy some share in the growing advantages of the big transaction, agriculture must not stand aloof, or it will eventually be forced to the wall. No movement will do more to establish the strength of agriculture than co-operative organisation, and this applies no less to the large than to the small farmer. The agricultural organisation societies should play an important part in the future of this movement. At the end of the War there will be an immediate call for the development of the work of such societies, and a definite detailed policy will have to be formulated. In regard to England and Wales the Agricultural Organisation Society foresees an increasing need for the spread of business habits among agriculturists, especially in the matter of book-keeping and accounts.

Roadside Grazing.

ROADSIDE grazing of stock (see p. 586) is commonly practised in some parts of the country, and there would appear to be no reason why, in view of the ploughing up of grass land and at times when the pastures are somewhat bare, it should not become more common still. There are always difficulties, particularly in connection with the rights concerned, but good will and tact might well

enable all difficulties to be overcome. The grazing of cows along the roadside may give one or more of the pastures a rest and effectively serve to keep up the yield of milk. The labour side of the question is not serious, as it is usually met by the part-time employment of one or more boys or girls.

A Food Production Effort in Lancashire.

The note published at p. 576 is very suggestive of what can be done to improve derelict land and increase food production. Resource, skill, and determination to succeed in improving such land, may be expected to be fruitful in results, though difficulties are likely to arise. The County Agricultural Executive Committees, however, will do all they can to assist those who need help, and farmers need not hesitate to consult them and invoke their aid.

Agricultural Labour.

THE Army Council recently decided to release several thousand soldiers on agricultural furlough for harvest work. These men were to be distributed among the counties where labour assistance for the harvest was most needed. Farmers requiring additional labour should apply at once to their County Agricultural Executive Committee who will arrange with the Commandant of the local distribution centre. Also, of the 30,000 men who were to be called up for the Army 9,000 were left until after harvest. The Ministry of National Service was arranging for the employment of about 15,000 men *from public and elementary schools, scouts' divisions, etc.* over 17,000 prisoners of war were at work on the land in Great Britain early in August; and several thousands of workers were available from other sources (war agricultural volunteers seasonal workers, etc.). At the beginning of August the number of men in agricultural companies numbered about 70,000 and these are a permanent reinforcement to agriculture. Finally, on 8th August, Lord Clinton, Joint Parliamentary Secretary to the Board of Agriculture, in reply to question in the House of Lords by Lord Selborne, said he was authorised to give an undertaking that no more keymen would be withdrawn from agriculture, subject, he imagined to no urgent need arising for the Army which was not then anticipated. He understood that his authority went so far as to say that the keymen included in the 9,000 men to be left until after harvest would not be taken.

THE BOARD OF AGRICULTURE AND FISHERIES AND INCREASED FOOD PRODUCTION.

In a speech in the House of Commons on 18th July, the Right Hon. R. E. Prothero, M.V.O., M.P., President of the Board of Agriculture and Fisheries, made a statement as to the operations for which the Board are responsible.

Agricultural Wages Board.—Mr. Prothero dealt first of all with the Agricultural Wages Board which has been set up in accordance with the Corn Production Act, and stated that "there are thirty-nine District Wages Committees. They are all also set up, and the Board has already issued notices for twenty-two counties of the statutory rate of wages. The notices are already advertised for another eighteen, and in the course of time the rates will be fixed in the other counties which are left out at present. The wages are mainly in the region of about 30*s.* a week. Whether they can be continued to be paid depends largely upon prices. Of course other things may help. Better organisation of labour and increased machinery may help if we can increase the produce of the land without increasing appreciably the cost of production. That, again, will be of very material assistance, and that form of help we expect from men of science. It is, therefore, a natural transition, I think, to turn from the Wages Board to scientific research.

Research.—"This is a field which is very large. To describe it in detail would occupy all the time at my disposal. I can only allude to the work of Dr. Russell at Rothamsted on the problems raised by the conversion of grass land into arable land and the research for an efficient soil insecticide. Again, I must only allude to the work done at Cambridge by Professor Wood and Mr. Hopkins on animal nutrition, and particularly on economy in beef production. I desire to illustrate the possibilities of scientific research in agriculture from the plant-breeding work of Professor Biffen at Cambridge. It is almost one of those romances in which science abounds. It is more than fifty years since the Abbot Mendel discovered the laws of inheritance. Those laws remained unrecognised until the present century, but on them is founded a new science. It has been discovered that you can create a new variety of plant by transferring to it the hereditary inherent characteristics of other varieties of plants. The result of this is most remarkable. Instead of having to wait for the chance discoveries of nature

we can deliberately sit down and manufacture the kind of plant that we want. The experiments of Professor Biffen with rust-resisting varieties of wheat are typical of the process. After examining a number of varieties of foreign wheat he discovered a Russian wheat called *Ghirka*, which resists rust. Now rust destroys annually thousands of quarters of wheat, but this *Ghirka* wheat was of no use to the British farmer because its yield was miserably low. But Professor Biffen, by using the Mendel system, was able to transfer the rust-resisting quality of *Ghirka* to a high-yielding English wheat, and though that wheat has now been in use for several years it has shown no tendency whatever to revert either to the rust tendency of one parent or the low-yielding tendency of the other. He has now produced a wheat which produces a high quality of straw—a fine, stiff, upstanding straw— and a high quality of yield of grain, so much so that without pushing it will produce 42 bush. to the acre, and by pushing up to 72 bush. to the acre. It also possesses a very high quality of disease resistance, and it combines with these qualities the quality of strength, which is so highly valued by both millers and bakers, and which is recognised in increased prices.

" Hitherto the plant-breeding work has been hardly applied to any of the crops of the farmer except wheat—though it has been applied partly to barley—and mainly to wheat suited to the Eastern Counties. But suppose you apply it to the wheats and barleys used in other districts, to oats and rye, to temporary grass and potatoes. There is an extraordinary list of possibilities opened to the British farmer. If, for instance, you could produce a potato which was immune from blight and immune from wart disease, it would be an invaluable boon to English agriculturists, and there is every prospect that that may be achieved. If any millionaire is to survive the vigilance of the Chancellor of the Exchequer he cannot do better than turn his attention and his money to the Plant-Breeding Institute at Cambridge and to the Institute of Applied Botany which we are endeavouring to found there, and I believe that he would confer a great boon upon the agriculture of this country. . .

Cheese Schools.—" There is one small piece of practical work to which I should like to allude in passing. That is to the cheese making schools which have now been started in a large number of counties. That movement started in the autumn of 1915. It has been greatly developed under the pressure of the War as to the most economic use to be made of surplus milk and we have them now in some 33 counties, and we have

co-operative cheese schools also in another seven counties. In some counties they have taken a firm root and they have established a real industry.

Milk-recording Societies.—" One deplorable result of the War is that milk-recording societies have practically come to a standstill. Anybody who has had experience of the value of these societies will regret that result of the War. There are only 25 of them now and the loss is very great. I wish they could be extended.

Farm Colonies.—" The Board's Report about the farm colonies has come up for discussion on the Bill extending these farm colonies. Nobody, I venture to say, knows better than I do how inadequate a provision has yet been made, or even foreshadowed, for the great want that there will be for land after demobilisation. The Board's plans for providing for the wants of demobilised soldiers and sailors have been before the Government for some time and are still under consideration. . . .

Live Stock.—"As to live stock, veterinary science has now got a magnificent laboratory equipped in Surrey, and I hope that the future use of that laboratory will result in great advances in veterinary science. I may say that the health of the live stock has been, on the whole, extremely good. There has been an outbreak of parasitic mange among horses, but there is a great reduction in the sheep-scab, and up to a very few days ago I should have been able to say a great reduction in swine fever, and that in spite of the fact that the Board, early last year, relaxed its Regulations in order to encourage and maintain the pig population of the country. The numbers of live stock in England and Wales may be of interest to the House. I should like to compare the Returns of 4th June, 1914, and 4th June, 1917, with the estimate for 4th June, 1918. The number of dairy cattle shows an increase in the present year on the figures of both preceding years; that of beef cattle over one year old shows a slight diminution on the figures of 1917, but an increase on those of 1914; that of all cattle under one year shows an increase over both periods. The total net result is a diminution of 27,000 head of cattle on the figures of 1917, and an increase of 330,000 on the pre-war period of 1914. The number of sheep shows a decline, and it is a decline on the figures of 1914, and a smaller decline on the figures of 1917. That result is mainly due to the disastrous lambing season of 1917. It has already been partly counteracted by the more favourable season of 1918.

"The pig population of the country declined last year very seriously, from October onward. That decline has, however, now been arrested. The Board has always been in favour of as large an increase in pigs as possible in this country, provided that pig-keepers do not trespass too largely on the breadstuffs of the people for the food of pigs. The hon. Member for East Grinstead (Mr. Cautley), now gives us the benefit of his valuable help, unpaid, in looking after the pig industry in this country. He has already achieved valuable results. . . .

"Individual landowners have taken up this question of increasing the number of pigs with great vigour. In Gloucestershire, for instance, the hon. Member for the Wilton Division (Sir C. Bathurst), a few weeks ago, had already been instrumental in establishing 65 pig clubs. The Rural League set up 130 in different parts of the country. We have many agencies working in the same direction, and were I quite sure of the supply of feeding stuffs and of its distributon I should regard the situation as promising. . . .

Forestry.—"In forestry the principal feature of the period under review has been the admirable Report of the Forestry Sub-Committee of the Reconstruction Committee. . . . I feel sure that the Report lays down the lines on which forestry must for the future advance. The Board has already, in consultation with the Minister of Reconstruction, formulated its plans. We are ready to start as soon as we have the funds, and we are making certain preparations. We have got in the Crown Nurseries upwards of 30,000,000 plants ready for transplantation, mostly conifers. We are preparing to sow a large quantity of seeds this autumn. We are arranging for the training of disabled officers and soldiers as forest officers and woodmen, and the first of our classes opens at the Forest of Dean on the 3rd August. In this and in almost every other side of our activities we have proved the great advantage of woman labour. . . ."

Food Production.—Mr. Prothero next turned to the question of food production on farms. After remarking that this was the first opportunity he had ever had, although he had been some time now at the Board of Agriculture, of explaining to the House what the Board has been doing, he proceeded: "What, I think, the House would like to know is this: How much money has been spent, on what it has been spent, and what have you got for your money? . . . I propose to give you the information under seven heads: First of all, the headquarter staff, then County Agricultural Executive Committees,

then labour, then ploughing, cultivation, machinery, supply of labour, horticultural operations, and then a few words as to miscellaneous expenses. . . .

" The harvest of 1916 proved a disappointment. Fertilisers, feeding stuffs, and implements were scarce. Something like two-thirds of the labour ordinarily employed on farms had been taken away from the farms which were previously, in many instances, under-manned, and farmers were quite unable, owing to the uncertainty as to the amount of labour which they could retain, to make plans for the cropping of the land. Meanwhile, the activity of the submarines, the stringency of our finance, and the strain on our tonnage, seemed to render it important that we should increase to the very utmost the output of food in this country. The materials most wanted were breadstuffs. Four-fifths of our requirements are normally imported, and corn being a bulkier cargo than wheat, is more difficult to carry in reduced tonnage. It was therefore decided, in December, 1916, to attempt what looked like an impossibility—to increase the area devoted to corn, roots, and potatoes. We knew that foodstuffs were likely to become extremely scarce, therefore we wanted to increase the area devoted to roots, and also to peas and beans, which I need hardly remind the House are, in farmers' language, included in the word 'corn.' We wanted to produce these crops for the human food, and also the animal food of the country.

" We opened this campaign on the 20th September, 1916, on a black winter day, and in what proved to be a protracted and severe winter. Though the general policy was dictated from Whitehall, it was felt that it must have agricultural opinion behind it, or it was doomed to failure. So it was decided that the movement itself should be in each district mainly controlled and directed by the farmers themselves, and for this purpose the best agency seemed to be the Local War Agricultural Committees which had been set up by Lord Selborne on the recommendation of the Milner Committee in 1915, and which were in some counties active, while in others they have had nothing but a nominal existence. It was through all these bodies that the campaign was opened on 20th September, and at that meeting, and in two circulars issued by the Board, dated 28th and 29th September, the immediate programme of increased tillage for 1917, and the further programme of increased tillage for 1918, with its motto of 'Back to the 'Seventies,' were sketched in outline. The formation of district subcommittees and of sections for the encouragement of allotments

and village pig-keeping was set forth ; and the prime necessity of getting a survey of the land in each county and of the area of grass land which could advantageously be brought under the plough, was insisted upon. The reduction of the area devoted to luxury crops, like mustard grown for seed, or flowers and bulbs, was pointed out and urged upon the Committee, and finally the promise was made to the Committee that they should have clerical and skilled assistance, that they should have furnished to them for each county a quota of produce, and that they should also have compulsory powers to enforce cultivation wherever it might be necessary. Early in January the Board transferred to the War Agricultural Committees most of their own compulsory powers. It required those War Agricultural Committees to act through Executive Committees, which were appointed according to the terms of the Order. Before the end of the month the Executive Committees were in existence with competent executive officers. The whole of the counties were grouped into 17 districts, subsequently increased to 21 ; in 15 out of the 17 districts Commissioners were appointed, and these instructed in their duties, among which was to forward a weekly report of progress. Before the end of the month one of the committees completed its survey. The first derelict farm dealt with was on 5th February, 1917. By the end of the month they were all actually at work stimulating cultivation and laying their plans for increased tillage.

The Food Production Department.—"Meanwhile, on the 1st January, the Board set up a Food Production Department. I think the House is probably aware that the Board of Agriculture had been for years something in the nature of an agricultural local government board—that is to say, its only duty had practically been to administer certain Acts of Parliament and to encourage agricultural research—and it had been divorced from any direct participation in the agricultural industry. It had nothing to do with prices, it had nothing to do with labour, it had nothing to do with fertilisers, it had nothing to do with feeding stuffs. Now it seemed to the Board that, inasmuch as farmers were placed in a position when they could no longer get the necessary requirements of their trade by themselves independently, we must pursue a new action, and so the subsequent history of this movement has been not a gradual loss by the Board of Agriculture of powers which it never possessed, but its acquisition of new powers in the face of Departments which were already strongly entrenched and

already in possession of those powers. I think it only right to make that explanation, because it has very often been thought that the Board of Agriculture gave up some right of fixing prices. It never had it. The right of fixing prices belonged to the Board of Trade, and the only maximum price that had been fixed in 1916 was fixed by the Board of Trade. So also with fertilisers and feeding stuffs—they belonged to the Board of Trade.

"We set up this Food Production Department on 1st January, 1917, and we set up at once sections in it to deal with local organisation—that is to say, with the War Executive Committees—to deal with supplies, including fertilisers and seeds, to deal with horticultural work and allotments, and with labour, and with machinery. We collected an admirable staff of technical assistants from the colleges and institutes, and an advisory committee was set up, consisting mainly of farmers, who met for the first time, I think, on 19th January, 1917, and have sat since then continuously, meeting every fortnight. At the same time we established a woman's branch, exclusively run by women for women, to deal with whole-time and part-time workers, and we strengthened the county organisations. We also set up a credit system for farmers, for the purchase of the requisites of production, arranged through the joint stock banks. To meet the labour difficulties, or to help in meeting them, orders were placed for a large number of tractors with the Ministry of Munitions, steps were taken to discover the number of steam ploughing sets, and to obtain the return of the essential men to man them. We made arrangements with the War Office for the supply of agricultural companies formed of soldiers, for the supply of German prisoners, and for the hire of heavy horses with soldier drivers, and with the Home Office for conscientious objectors. That, however, never came to much.

"The spirit of the agricultural community was excellent. They were willing to make great sacrifices in the interests of food production, but they were naturally reluctant to plough up their grass. Nobody, except in rare cases of potato land, is much disposed to plough up grass. In the first place, grass is in a way the sheet-anchor of their safety. Its profits are sure, the outlay is small, the labour bill is small, and also farmers have had 40 years' bitter experiences of corn prices, which had ruined thousands, and they were naturally, though prepared to make great sacrifices, not prepared to face such a slump in corn prices as would drive them to bankruptcy. It was in order to remove that initial difficulty that the Govern-

ment decided to guarantee minimum corn prices for a period of years, and the Prime Minister's speech on 23rd February, 1917, announced that policy. We were very late in the season, and we could do very little for 1917, comparatively speaking. But we did get, considering the time, a very considerable addition of land under crop. I think I am speaking within limits when I say something like 280,000 acres. At a time when the world's supply of food became seriously short, that extra supply helped the country very materially to turn an awkward corner, and the huge potato crop proved perfectly invaluable to the nation.

"The first edition, so to speak, of the Food Production Department was headed by officials of the Board. Their time was absorbed in conferences with the War Office and the Ministry of Food on a variety of topics, and whatever time remained—and work was often prolonged till midnight—was spent in organising the War Executive Committees and in installing the new Department into its new offices. But it became increasingly evident that if we were to grapple with this problem satisfactorily, we must have a chief at the head of it who was prepared to devote his whole time to perfecting and running the machine. That chief we were fortunate enough to find in Lord Lee, then the hon. Member for the Fareham Division, and chairman of the Bucks Executive Committee. In his hand the Food Production Department became a living, effective organisation. His organising ability and his energy, enthusiastically backed by a most loyal and able staff, filled in, as it were, all the details of the framework and clothed the skeleton with flesh and blood and muscle. It is very largely owing to him that the Food Production Department has been able to help so effectively the movement towards increased production, but while I want in the fullest possible way to acknowledge my debt to my colleagues in the Food Production Department, I do not, I need hardly say, desire in the remotest degree to evade my own personal and official responsibility. I met the Director-General in personal consultation three times every week, and once a week I presided at a conference of all the officials of the Food Production Department. . . .

The County Agricultural Executive Committees.—"I go on to the County Agricultural Executive Committees. There are 63 of these committees, and there are some 500 district sub-committees. Each of the executive committees is allowed expenses for office staff and funds for office management. These have formed themselves into sub-committees dealing

ith labour, machinery, supplies, finance, and, in the last few eeks, threshing machines. Through the district committees ıe executive committees are in touch with every district. he counties, as I have explained, are grouped into 21 districts, ıch with a district commissioner, who is himself *ex officio* a ıember of all the executive committees within his district. : is to these War Executive Committees that the Board has elegated its powers, and it is through them that the Depart-ıent acts. The members of these committees are, for the ıost part, men of business, dependent for their livelihood on ıeir business. Yet on both the executive and district com-ıittees they have given their time, their skill, and their xperience without any pay or reward. They are all of them npaid. The tasks they have had to perform are extremely ifficult, delicate, and invidious. I think they have faced ıem with a rare courage as a public duty in the national ıterest. Mistakes, of course, they have made. The enormous mount of work they have had to do would make it perfectly bsurd to expect anything else. But I am convinced of this, hat anybody who knows their work believes that their work as been done both ably and well, and the nation owes them a reat debt of gratitude.

Survey of Agricultural Land.—" Their work has been very aried. I will only mention two points. One was the survey f the condition of agricultural land. The result of that has een that we know far more of the condition of agriculture in his country to-day than we have ever known in the history of griculture. We have got a good record of the traditions of ultivation of the land. The other task to which I allude was he task of issuing notices for ploughing up grass and for specific cts of cultivation. Something like 100,000 notices have been ssued by these committees. I think it speaks volumes for the ɔatriotic feeling of both landowners and farmers that in only ;72 cases was the Board asked to authorise proceedings for vilful failure or neglect to carry out those Orders. In the najority of these cases proceedings became unnecessary, and ɔnly 72 cases have come into Court, and in only one of those ɔases have we failed to get a conviction. But even if all the ɔrosecutions which were authorised had resulted in proceedings t would have been something below one-third of 1 per cent. ɔf the notices which were served, and the result of the work of the committees has been not only a great increase in the area ɔf arable land, but a most substantial improvement in the general standard of farming throughout the country.

Drainage Schemes.—" I may, perhaps, add also that the drainage powers conferred by the Board on these committees have been used with very great success. We have in hand schemes, some of which are already completed and some are approaching completion, by which something like 120,000 acres of land will be brought into profitable cultivation. I mean by drainage not pipe drainage, but the drainage of surface water.

Now the expenditure on these local organisations for the 15 months ending 31st March, 1918, falls under two heads. First, there are the administrative expenses for the 63 executive committees and 500 district committees. Members have given their services unpaid. The total sum is £176,038. The Grants for farming and drainage and other operations, the bulk of the expenditure being recoverable, have been £146,522, making a total expenditure on the local organisations for those 15 months of £322,560.

Labour.—" I should like to make it quite clear that no labour is given to the farmer. The farmer pays in every instance the local wages rates of the district, except in one instance. He pays 5*d.* an hour to the German prisoners, which is slightly below the rate for agricultural labour. Of course, agricultural labour has been throughout the very great difficulty with which we have had to contend. Agricultural labour is so much less mechanical than other labour that it is far more difficult to deal with it, either by dilution or substitution. Nothing can replace to the farmer the man who knows the land on which he has worked all his life probably, and who knows not only what he has got to do, but how he has got to do it. And it is for this reason that the Board has throughout endeavoured to secure to the farmer men indispensable for cultivation and so far as the exigencies of the military situation would allow, to make sure of the number of men which he would be able to command. It is the uncertainty on this point that almost paralyses his efforts. From June, 1917, to April, 1918, when the Royal Proclamation was issued, this difficulty was satisfactorily met. The Cabinet decision during that period remained in force, that a man who was on a farm on the 1st June, 1917, and whole-time employed on farm work of national importance, could not be posted without the consent of the War Executive Committee. That secured us our labour for that time, but even during that period the shortage was severe.

" In quantity, of course, the loss of labour was mitigated, but in quality the loss could not be made good. The new labour was, for the most part, unskilled and inexperienced, and it is quite obvious that dealing with labour of that kind

increases expenses very largely. Less work is done, and the work that is done is less efficiently done, and at no time during the whole of this effort was the Department able to secure what it had put forward as its minimum requirements, and which were promised by the Government. We had to do the best we could. Naturally, the supply of this outside labour has varied enormously in these 15 months. I could give it month by month, but I do not know it would be worth doing. But I may give it at the beginning of the financial year—that is to say, on 1st April, 1917, and at the end of March, 1918. On 1st April, 1917, when we were in the full swing of our ploughing operations, we had approximately 36,000 soldiers including ploughmen, who had been returned from the front for that special purpose—men of the Home Defence Force and Agricultural Companies, and 830 German prisoners and interned aliens. At the end of March, 1918, we had 61,000 soldiers and 10,200 German prisoners and interned aliens.

Woman Labour.—"The other supply of labour is woman labour. As I have said, we created this branch early in January. It has been run throughout by women, and since the food production campaign began the number of women on the land has been increased from something like 91,000 to over 300,000, that is to say, whole-time and part-time workers. The local organisation in each county consists of a Women's War Agricultural Committee, of district sub-committees, an outfit officer who distributes the outfits, and a village registrar. All these are volunteers and unpaid. Besides this, we have a paid official staff of one organising secretary in each county, and for all the counties of England and Wales 17 travelling inspectors. The House may think that organisation is elaborate. May I put one reason why we could hardly make it less? The Board undertakes a very serious responsibility if it sends young women on to the land in a remote country district without making tolerably certain—in fact, without making quite certain—that they shall have a friend within reach to whom they can go in any difficulty. This is the object of this rather elaborate organisation. Moreover, the work of the local organisation includes the inspection of billeting accommodation—a very important point—the introduction of the supply of labour to farmers often averse to a novelty, the formation of groups of part-time workers under skilled leaders, so that in the case of each woman who can only serve half-time they can make up the whole-time work from a group of women, and the collection of seasonal workers in large numbers.

"Besides the village women included in the 300,000, there are what we call the Land Army. These are women who have undertaken to work on the land and to go wherever they are sent. They are recruited from all classes of the women of this country. I hope the House appreciates the difficulties with which we are faced in respect of these, what I may call mobile women. The agriculturist cannot compete with other industries in respect of wages. Physically the work is hard. It is monotonous. It is carried on out-of-doors in all conditions of weather, and in respect of accommodation it implies real privation and real hardship. These facts have never been concealed; yet we have got, or we had at the end of the financial year—the numbers are larger now—11,000 women who had patriotically responded to the appeal. That appeal is strengthened, I think, by the fact that they have to make sacrifices, and have to endure privations, which to some extent are comparable to those of their friends and relations at the front. Certain inducements we do offer. We give a month's training free. I know you cannot call it real training, it is more to get their muscles into something like condition, to give them something approaching the condition required for agricultural work. We maintain them in depots between the terms of training and of employment. For instance, we get them trained and it may be some weeks before they get employment. Again, they may leave one employment and they may have to be kept before they get another engagement. We keep them during these periods at depots. We provide them with an outfit. I should like to say a word or two about the outfit. It is not a decoration. It is absolutely essential for them in which to do the work they are called upon to do. It happens, I think, to be pleasing to the eye, but that is owing to the fact that it was chosen by women for women. I cannot claim any credit for that. We do, however, give them a certain outfit and we renew it half-yearly. The total expenditure upon the women's branch during the period of 15 months has been £230,273. The principal item is for this outfit, which comes to £130,037. . . . Part of this payment includes boots for the village women. These find it very difficult to get boots at all. We found this difficulty so great that we said we would get them for them if they paid for them, and the Treasury allowed us to make them a grant of 5*s*. towards the cost of these boots. Some part of that expenditure is capital expenditure on the outfit, besides depots and furnishing. But I can give the amount we actually received up to 31st March, 1918. It was £48,440. . . .

Ploughing and Cultivation.—" I now pass to the fourth head, ploughing and cultivation. In spite of every effort we could make to find labour, the shortage of manual labour was most acute, and we had to provide mechanical and other assistance. Once again I should like to remind the House that without the help of the Board the farmers could not have helped themselves. The sources of supply were cut off from them, and the richest and most independent of them could not buy English-made machinery nor secure a supply of motor fuel, nor purchase implements or harness. Therefore, we had to do for the farmer what the farmers, I daresay, would have done much more easily for themselves, but which they could not. In the case of steam tackle, there were, in January, 1917, 510 sets. Of these only 250 were able to work, because the owners could not get them repaired, or had lost their skilled men. The Department was able, by the summer of 1917, to put 210 of these broken-down steam-tackle sets into operation, and to get back from the Army 300 skilled men to drive them. The remaining 40 sets were obsolete, or beyond repair. Since then we have been hoping for 90 additional steam-tackle sets for the ploughing season of 1918. Of course, steam tackle and steam cultivation remain on heavy land by far and away the best implement for ploughing. We must, therefore, make every effort in that direction.

Horse-drawn Implements.—" Take horse-drawn implements. We arranged with the War Office for facilities for farmers to hire horses and soldier drivers. We also obtained the sanction of the Treasury to purchase a number of horses, and we made the necessary arrangements. During this period we have placed 9,749 horses at the disposal of farmers on hire. We have had going 36 ploughing schools in the country. We have trained a very large number of ploughmen with the horses. We have also had to provide the necessary ploughmen. We have provided horse-drawn implements. We have consigned upwards of 18,000 binders, ploughs, drills, harrows, presses and rollers, and every other kind of implement to executive committees for their own use or for hire out to the farmers.

Threshing Tackle.—" As to threshing tackle, we have had very great difficulty in increasing the supply beyond the increased supply provided last year. I am glad to say, however, that I think we shall have something like 350 additional threshing machines available for the coming harvest. The County Executive Committees have, at the request of the Department, appointed sub-committees, whose duties are to

get the threshing tackle into repair, and find the necessary labour to organise and use the tackle to the very best advantage, so I hope we shall be able to cope with the demand.

"The total expenditure under the head of steam tackle, horses, and horse-drawn implements was £319,269. The greater part of this expenditure, of course, is recoverable.

Tractors.—"A great development has been effected by the Department in the use of tractors for ploughing and cultivation. Many difficulties were encountered. Supplies from overseas came in but were liable to interruption. The English makers' works were closed, and the farmers looked with great suspicion upon the tractors as novelties. They were, however, only too pleased to put them into use; at all events, in some parts of the country a very difficult task. But, as I say, they were pleased to obtain the machines in the great emergency in April and May, 1917. We had a fleet of some 666 tractors, some of which we owned and some of which we hired. I have no doubt whatever that much of the tractor ploughing done at that period was costly and inefficient, but there was no other way to get the land up. We had to do the best in the very great emergency, and all due care was exercised, and I have no doubt the best possible results obtained. We stand in a different position now. At the beginning of the financial year, that is, in April, 1917, we had 660 tractors, some hired and some Government-owned. At the end of the financial year, 1918, there were 3,000 Government tractors at work, and it may be of interest to know that the tractors dealt with, I think 611,000 acres, and that the steam-tackle sets dealt with something like 1,000,000 acres. We have had to establish a base depot for tractors at Willesden. The reason for that is that we wanted to avoid the duplication of supplies. If we had supplied each executive committee with spare parts and fuel we should have had to supply a very much larger quantity than by having the base supply, and by having this the committees have been provided, and great economy effected. We have had ploughing centres where we have trained 6,000 men for ploughing, as well as a very large number of women, who are very successful with the lighter type of tractor. The schools, having done their work, are now closed. . . .

"The working expenses (including all salaries, wages, bonuses—there is a bonus upon ploughing above a certain quantity in a certain time—fuel, spare parts, repairs, insurances under the National Health and Workmen's Compensation Acts, a portion of the expenses of the head office and the

executive committee) amount per unit of ten tractors—that is the way in which we handle it—to £136 10*s.* a week. Each tractor is estimated to plough 10 acres a week, and each unit, therefore, ploughs 100 acres a week. At the minimum charge of £1 per acre there is a weekly earning of £100, or deducting 7½ per cent. for bad debts, of £92 10*s.*, as against the working expenses of £136 10*s.* If you bring these figures down on an acreage basis the cost is 27*s.* 4*d.* an acre, against the net earning of 18*s.* 6*d.* per acre. . . . . If you put depreciation at 20 per cent. per year on all the tractors, the ploughs, and other equipment, it would add £13 10*s.* to the weekly cost, so that the weekly cost would be £150. . . . The £150 is not wholly cost to the State, as I was explaining, because two-thirds is recovered by the charges which are made, and with regard to the £150 you must remember that it includes depreciation on capital expenditure. The total amount expended on the purchase of the necessary implements and equipment from 1st April, 1917, to 31st March, 1918, was £895,685. The working expenses for the same period were £700,095, making a total of £1,595,780. . . . .

Supplies.—*Fertilisers.*—" I pass on to the fifth head, namely, supplies. In dealing with the supplies, fertilisers are, of course, our principal difficulty. The manufacture of fertilisers rests with the Ministry of Munitions, who have always helped us in the greatest possible way. Since March, 1917, distribution has rested with the Department ; before that time it belonged to the Ministry of Food. We have arranged a flat rate of railway delivery so that the farmers of the United Kingdom, however distant, get their sulphate of ammonia exactly at the same rate. One great difficulty we had to deal with was that the works became choked and impeded as the sulphate of ammonia accumulated, and the relief which the makers of sulphate of ammonia found was by exporting it. We had to stop the export, and at the same time provide some means by which the congestion could be met. We arranged a sliding scale of payments, by which merchants were encouraged to order early, and the price was raised towards the end of the fertiliser season. This worked with remarkable success. The fertilisers have gone off quite easily, and there has been no congestion. Another thing we have done is to take in hand the railway distribution of fertilisers. Every manufacturer is allowed to supply his old customers within a 5*s.* railway radius. Beyond that he has to come to the Board for a special licence, and we exercise that licence with due regard to railway

transport and the facilities of supply wherever the manufacturer proposes to send the fertilisers to. We have consulted the Railway Executive over this scheme, and they sanctioned and approved it.

"We are dealing on the whole with superphosphate, sulphate of ammonia, and basic slag to the extent of 1,100,000 tons, and we hope we shall effect a saving of something like 20,000,000 ton-miles by this method of licensing, which is a matter of great importance. We have also managed to increase the supply of sulphate of ammonia very considerably. The amount of sulphate of ammonia consumed by the end of the fertiliser year of 1916 was something like 65,000 tons; at the end of this fertiliser year, namely, the 31st May, 1918, we had used 238,000 tons, and we could have sold a great deal more if we had been able to do so. We increased the amount of basic slag very greatly. We hope in this coming fertiliser year to have an increase of between 300,900 and 350,000 tons. We have prevented compound fertiliser manufacturers utilising superphosphates and sulphate of ammonia at a higher price than those ingredients sold for. We oblige them now to give an analysis according to the fertiliser constituents of the compound. It is a thing for which agriculturists have been clamouring for years.

"Superphosphates, of course, we have great difficulty in dealing with, because the ingredients are from abroad, and I think I ought quite frankly to confess that we made one bad blunder. We wanted superphosphates very badly in March, 1917. We wanted to get it on the land immediately. We heard of a cargo of superphosphates at Lisbon. We bought them. We thought we had arranged Blue Book rates. We did not get Blue Book rates; we got the ordinary freights, and we found we had landed with a very considerable loss—a loss of £28,000, or something in that region. But we got the superphosphates on the land, and if you put into the account what is calculated to be the ordinary increase of 1 cwt. of superphosphates, which is 4 bush. to the acre, I think we may possibly have recouped the loss of that unfortunate blunder.

Seeds.—"In the case of seeds we had to do what we very much dislike doing, and that was going into trade at certain times. We tried our utmost to do everything through the seed merchants, who most loyally co-operated, but on occasions we have had to buy seed wheat and seed oats—seed wheat, for instance, for the spring operations of March, 1917, seed oats for the last winter, because these supplies were very scarce. We have, in each case, recouped ourselves the outlay, but we

never wanted to go in for the seed trade, and, as I have said, have always tried to do everything through the trade.

" As to *seed potatoes*, nobody who remembers the bungle and confusion which occurred in regard to potatoes in 1917 will fail to understand that in carrying out the large orders which we had to do on that occasion for the small allotment-holders it was easy to make a blunder. We had to deal with £200,000 worth of potatoes for seed. We had contracted with the allotment-holders to sell them at what was then the seed-potato price, but after many fluctuations . . . we ultimately fixed it at a much higher price than we had contracted to sell them to the holders. We had to decide whether we would charge the allotment-holders or stand the loss ourselves. We decided to stand the loss ourselves, and it came to something like £5,000. I think on a transaction of £200,000 to lose only something like 2½ per cent. was not in the circumstances a very heavy expense.

" There are other points in the supplies which we have had to deal with. We have got a considerable supply of potash coming forward. We have provided for binding twine. We have had to provide seeds for allotments. That is the greatest difficulty in the development of allotments, and in order to provide the seeds we had to get the seed merchants to consent to limit their export trade until we knew that our home wants were met. They did that very loyally, and we had to provide ourselves with seed. Then there is the question of spraying. We had to provide over 6,000 potato-spraying machines, all of which were sold very rapidly to the farmers or to the allotment-holders. I think there were 6,746 machines, which were sold at cost price or at very little more to the allotment-holders. We have had many demonstrations in the use of spraying, and I hope that it has been pretty general this year. The total charges for the supply division were £437,947, out of which we expect to recover £372,177, and we have recovered £282,955.

Horticulture.—" There remains the horticultural side. It has been most carefully organised to encourage the allotment-holders and small cultivators. We have horticultural representatives in 918 districts, and it is mainly owing to their efforts that we have formed 741 food-production societies. We have also given instruction to the allotment-holders through a panel of gardeners, numbering over 2,000, who have given their services without payment, and our inspectors have encouraged the growth of allotments. Some of these returns as to the number of allotments may be of interest. In county boroughs the increase of allotments is 279 per cent. In 125 towns from

which we have received returns the increase is 131 per cent. In 499 urban districts the increase is 164 per cent. Altogether, whereas the number of pre-war allotments was 570,000, it is now over 1,400,000. We have also taken in hand a very considerable amount of work in the preservation of fruit and vegetables. We set going a very considerable organisation for that purpose at the request of Lord Devonport, then the Food Controller, but in November the Food Controller demanded our organisation back again. We were not unwilling to give it up, and we were only too glad to be able to hand him over a going concern. We continue to look after some fruit and vegetable methods of preservation, such as canning and bottling, and whereas the number of bottles generally provided is something like 600,000, we have now obtained and are in course of distributing something like 6,000,000 bottles. That will give some idea of the extent to which the preservation of fruit and vegetables has been carried. We have also provided for the making of agricultnral baskets, and I hope that something like 1,000,000 baskets—a matter of great interest in all fruit and vegetable work—will have been provided. Altogether the expenses of the horticultural branch have been £109,403, of which a large part, of course, is recoverable. . . .

Miscellaneous.—" The last item is ' Miscellaneous.' There are not really so many items under that head as might be expected in such a lengthy list of expenditure. The total expenditure under ' Miscellaneous ' is £4,934.

Seed-testing Station.—The most important item is that of a seed-testing station. We set up a seed-testing station at which seeds can be tested for purity and germination. Hitherto it may surprise the Committee to know that in England, although it is the greatest emporium for seeds in the world, we have sold our seeds abroad with a foreign certificate as to purity and germination. The seed-testing station was started on a small war scale, but already it promises to become self-supporting.

Results.—The total expenditure under all those heads is £3,133,003. Out of this we expect to recover £1,452,940, leaving an expenditure—and you must remember that a great part of this is capital expenditure—of £1,680,063. Of the recoverable amount, we have already, up to 31st March, 1918, recovered £602,985. Therefore, the expenditure which may be charged against the Food Production Department is £1,680,063. A great part of that, something like £1,200,000, is capital expenditure, and if you spread it over a period of four years obviously it becomes a much smaller sum. That

is the amount which has been spent and how it has been spent. The House would like to know what it has got for the money. After all, that is the most important point.

"We have been charged very often with dealing only with what we have done as a matter of acres. People say to us, 'Why do not you deal with it from the point of view of the produce?' Surely that is a most unreasonable proposition! How can we deal with what we have done as a matter of produce until the wheat, for instance, has gone through the thrashing machine? You do not know till then. All that we can tell is that as a result of this expenditure, instead of a considerable decline such as might have been expected in 1916, we have increased the arable area of the country by 2,142,000 acres. It has been cropped in this way: We have an increase of wheat of 752,000 acres, or 39 per cent., which is the highest acreage of wheat recorded since 1882. We have increased barley by 158,000 acres, or 11 per cent. We have increased oats by 735,000 acres, or 35 per cent., showing the highest on record by 23 per cent. We have not neglected the crops for live stock, because we have increased the acreage of rye, peas, beans, etc., by 280,000 acres, or 69 per cent. We have increased potatoes by 217,000 acres, or 50 per cent., giving the highest on record by 27 per cent.

"It does not stop at that. This movement has spread to Scotland and Ireland. We have the highest acreage under corn crops in the United Kingdom that has ever been recorded in the history of British agriculture. Nor has it stopped there. I will not say that the movement has been imitated, but it has set an example to France, to Italy, and to Greece. Our methods have been studied in all those countries, and in Italy and Greece they have been largely adopted, with the result that Greece hopes to become self-supporting with the harvest of 1918. Of course, you cannot tell what the harvest is going to be, but, subject to it being an average harvest, the position of the Allied countries as regards food is vastly better than it was in 1917 or 1916, and the relief to our tonnage in not having supplies from America by reason of the food supplies that are now grown here and in the Allied countries is very great and likely to be of material assistance to us.

Ploughing up of Grass.—"I should have liked to have gone further. I should have liked, if we had had the labour, to have ploughed up more land. I am afraid that in this matter of ploughing I am one of those who stand midway between two schools. There is one school which wishes to plough up nothing

and there is another school which wishes to plough up everything, and, like a member of a Coalition Government, I suppose I have no friends because I stand between the two; but I am convinced that with our existing supply of labour we could not safely carry out the programme of further ploughing which we had in mind. We had designed to increase still further the arable area, as we might possibly have done given the labour, with a view, some three or four years hence, of approaching the time when we might be self-supporting. I have said that it is impossible to carry out that programme, but we hold it before us as an ideal, and if ever labour is materially and substantially improved and secured we should be prepared to undertake some portion of it, but for the present we have suspended the issue of all ploughing-up notices. We have, of course, to deal with those notices which are already out, and as to those we have adopted the position that in each case they are to be reconsidered on their merits with regard to the supply of labour and the changed conditions which may have taken place. If no change has taken place in the condition of the farm which would prevent the notices being carried out, they will be carried out for this reason: The Orders which have been held in abeyance are Orders given out for the most part some months ago, and they were allowed to delay carrying them out in order, for instance, that they might get their hay harvest in. I feel that it would be so unjust to suspend them altogether if the man is still able to carry them out, and this would create an ill-feeling amongst those farmers who carried the Order out at once.

The Farmers' Sacrifices.—"In conclusion, I should like to say a word about the splendid support given by the farmers themselves. I do not think the public really understand what sacrifices the farmer has made. I am not talking about the man who grows some exceptional crops, but of the fixed arable farms, which are the principal stand-by in this country. I do not believe people realise what sacrifices of money profits those men make. They accepted the new principle which we tried to put before them. It is not now a question of what is going to pay them best, but it is a question of what will produce the most food, and they have most loyally met my appeal. Looking at the performance, which is, after all, not the performance of a Department or of the Board, but the performance of a great number of small men—after all, the vast majority of these farmers come under that definition—it is an effort to meet a great national emergency, and I regard the farmers' performance as one of the great achievements of the War."

THE IMPROVEMENT OF LIVE STOCK IN ENGLAND AND WALES.*

REPORT FOR THE YEAR 1917-1918.

THE Live Stock Scheme has now been in operation for four years, but its objects and methods are still so little known, except in districts in which it is in actual operation, that it may be well to explain very briefly that its chief aim is to improve what may be termed the commercial stock of the country by educating farmers and others to the value of using sound pedigree sires of good type and conformation and of keeping accurate milk records of dairy cows. To this end financial assistance of the following amounts is given annually to societies which are formed to promote the objects of the Scheme :—

Heavy Horse Grants.—A grant not exceeding £80 (£40 direct and £40 for assisted nominations) in respect of each stallion travelled by a society.

Bull Grants.—A grant of £15 in respect of each bull provided by a society, and of £12 if provided by an individual.

Boar Grants.—A grant of £3 in respect of each boar.

Milk Recording Grants.—A grant at the rate of £2 10s. per herd but not exceeding half the annual expenses of a society.

The period covered by this Report (1st April, 1917—31st March, 1918) is the fourth year of the operation of the Scheme, which has, therefore, only one more year to run to complete the quinquennial period allotted to it when it was first introduced and financed from the Development Fund. In estimating the results obtained it must be borne in mind that normal development of the scheme has been affected, except during a few months at the outset, by the increasingly adverse conditions arising out of the War. The withdrawal from civil life of so many of the young farmers and farmers' sons, who have answered the Nation's call to arms so readily, has considerably reduced the number of progressive agriculturists to whom the Scheme was most likely to appeal, and from whom much support was expected. Shortage of labour, rise in the price of sires, scarcity and increased cost of feeding stuffs, and uncertainty as to beef and milk prices, have also been factors which have militated against its full development.

* Owing to the War this article replaces the Annual Report on the Live Stock Scheme, which will not, therefore, be issued separately.

But if the War has tended to retard the development of the Scheme it has also demonstrated very clearly the importance of grading up and raising the standard of the ordinary farm stock of the country, so as to secure as large an increase as possible in the home supply of meat and dairy produce. What was long felt to be desirable the War has made urgent, and when hostilities cease, there will be, without doubt, a greater demand than ever, from both home and foreign markets, for a supply of cattle, especially of pedigree animals, to replenish the world stocks that have been depleted by the War.

In live-stock breeding quality and quantity are closely related. The better bred the animal the more likely is it to be a profitable investment both to the individual owner and to the nation, as a greater weight of beef or yield of milk can be obtained in less time and at less cost from a well-bred steer or cow than from a badly-bred one. Regard must be paid also to heredity if any degree of certainty is to be secured in successfully breeding either for milk or for beef or for both. These are not theories, but well established facts which have been proved by years of practical experience. Pedigree breeders are well aware of them, and the excellence of their breeds is testimony to the value of pedigree and of selective mating. It must be admitted, however, that farmers, however cognisant they may be of these fundamental laws of breeding, in a very large number of cases ignore them in their practice. They shrink from the immediate outlay and exercise little, if any, care in the selection of sires, and the results of their haphazard methods are only too evident from the large numbers of low-grade stock, unthrifty doers and poor milkers that are to be found in most parts of the country.

The Live Stock Scheme was initiated, therefore, in order to educate the ignorant breeders to the use and value of pure-bred sires and to the commercial advantages of breeding from parents, whose types and characteristics are known and have been fixed by a careful breeding, and which are more likely, therefore, to be reproduced in their progeny.

Inasmuch as the Scheme has been in operation for only four years any marked improvement in the stock of the country cannot be expected. It must be remembered that so far as horses and cattle are concerned few, if any, animals will have been bred under the Scheme during the five years ending 31st March, 1919, which contain more than one cross of a subsidised sire, whereas several crosses are essential to grade up inferior stock and to bring home to breeders the pecuniary and other

advantages of using good sires, and of exercising care in mating, feeding and rearing.

In this connection the work of the Live Stock Officers may be mentioned. They have got into close touch with large numbers of farmers in their provinces and have been successful in stimulating considerable interest in the Scheme, both direct and indirect, and have been able to foster healthy rivalry amongst breeders to possess better quality bulls and stock generally than have been hitherto kept by them.

The assistance and co-operation of the Provincial and Live Stock Committees have been of considerable value in the administration of the Scheme, and the Board are much indebted to the members for their help. It is satisfactory to be able to report that the Board received during the year under review representations from all the Provincial Committees bearing testimony to the direct and indirect value of the Scheme and urging the need of its continuance.

The Board fully realise that four or five years are quite inadequate to secure any material improvement in the stock of the country. Some progress is already visible, however, as a result of the Scheme, and it is something accomplished to have evoked interest, and to have overcome in some degree the indifference and prejudice of the ignorant and careless breeder which constitute so serious a barrier to improvement and development. The Scheme, which the Development Commissioners agreed to finance for the five-year period ending 31st March, 1919, may be said to have justified its existence, and though some amendment of it after the above-mentioned date may be considered desirable, the Board are satisfied that it is sound in principle and effective in operation, and they intend to continue it, and, when opportunity offers, to develop and extend its scope.

The amount available for the purpose of awarding grants during the year under review was allocated as follows:—

	£
Boars	1,348
Bulls	12,727
Heavy Horses	6,235
Milk	1,500
Total	£21,810

The following table shows the progress made by the Scheme during the four years it has been in existence, and in view of the prevailing conditions the progress made during the year 1917-18 was not unsatisfactory:—

Year (1st April to 31st March).	Boars.			Bulls.			Horses.		Milk Recording.	
	Societies.	Individuals.	Boars.	Societies.	Individuals.	Bulls.	Societies.	Stallions.	Societies.	Cows.
1914–15 ..	100	Nil	107	285	26	370	65	72	16	7,331
1915–16 ..	180	Nil	193	489	28	633	88*	97*	20	9,811
1916–17 ..	186	15	216	543	15	659	93*	108*	22	12,950
1917–18 ..	172	92	264	578	14	710	94*	110*	25	14,404

* Excluding the Cumberland and Westmorland Heavy Horse Society, formed in 1915–16.

Grants for Boars.—In many districts considerable difficulty is experienced in forming Boar Societies, and it has been urged that the amount (£3) of the grant made in respect of a boar is not sufficiently large to encourage farmers to pay the present high price of a suitable sire, and that boar owners prefer to be free from society regulations.

In view of the limited funds at their disposal the Board have not been able to increase the amount of the grant, but in order to encourage the use of any good sire that may be available, the award of grants has been made during the year to individual owners who agree to place their boars at the service of their neighbours. A substantial increase in the number of boars located has resulted. In some districts the grants available have been freely taken up, and some small farmers are beginning to appreciate the advantage of breeding from good pedigree boars. and have purchased pedigree gilts for mating with them. That this will be attended with satisfactory results is shown by a recent sale by a village shoemaker of a Gloucester Old Spots boar for 65 guineas. Unfortunately, however, the importance of a good boar is not so generally realised as it ought to be if it were remembered that a stud boar is often the sire of 500 to 800 pigs in a year.

The number of boars subsidised and placed out during the year was 264 as compared with 216 in 1916–17. Of the 264 boars located, 110 were Large White, 76 Large Black, 20 Gloucester Old Spots, 10 Berkshire, 17 Lincoln Curly Coat, 15 Middle White, 13 Cumberland, and 3 Large White Ulster. The average price was £9 6*s.* 8*d.* per boar, and the highest sum paid was £29 8*s.* for a Gloucester Old Spots. The service fees varied from 2*s.* to 7*s.* 6*d.*

Grants for Bulls.—Reference has been made already to the fact that marked improvement cannot be looked for, as the

Scheme has been in operation for only four years; but it is encouraging to be able to report that owners of heifer calves that have been sired by subsidised bulls rarely part with them, and if they do so they have no difficulty in finding ready purchasers. The best of the bull calves are also retained for use as sires, and those that are sold for rearing make good prices. Many members of societies that have been in existence for three or four years are learning the value of pedigree, and they begin to realise that well-bred stock costs no more to feed than mongrel stock, matures better, and is a far more remunerative investment when the time comes to sell.

The societies and individual owners who have purchased bulls under the Scheme often hesitated at first to pay more than £30 for a sire, but many of them are now quite willing to invest £60 to £100 in an approved sire. The visits paid by prospective purchasers to private pedigree herds and public sales of such animals have afforded valuable object lessons in the value of scientific breeding and rearing, and have encouraged the acquisition not only of pedigree sires but of registered female animals as well. Many members, too, are keeping careful record of the crosses by pure-bred sires so that the progeny in years to come may be eligible for entry in the Herd Book of its breed. This, again, is a true index of the educational value of the Scheme.

It must not be imagined, however, that this progressive attitude is general throughout the country, as the beneficial effects of the Scheme have not permeated any distance outside the areas in which it operates, and there are still large numbers of stock owners who are indifferent as to the class of sire used by them provided its services are cheap and to be obtained without trouble. There is no need to labour this point beyond referring to the operation of the Calf Orders, which have furnished all too convincing evidence of the large number of calves produced annually, especially in some dairying districts, which are of such inferior quality or so unthrifty or ill-developed as to be quite unfit for rearing for beef or milk purposes. This condition of things is a disgrace to the stock-breeding industry of the country, but it is hoped that a continuance of the Live Stock Scheme may gradually secure a considerable measure of improvement.

As was the case last year the bull section of the Scheme has progressed notwithstanding the scarcity of good bulls at moderate prices, and the societies, with few exceptions, have continued to show keenness in the selection of their sires, and as

occasion arose for the substitution of a new bull every effort has been made to maintain and, if possible, to raise the standard of the sire. Numerous instances have been reported of subsidised bulls making high prices when sold abroad, and one society had two bulls which when purchased for their use cost £50 and £60. respectively, and when subsequently disposed of in the Argentine made £523 and £436.

The number of bulls located at the close of the year 1917–18 was 710, as compared with 659 in 1916–17. Of these 696 were provided by 578 societies, and the remainder by 14 individuals: 528 were located in England and 182 in Wales. The number of bulls actually purchased and owned by societies was 69, the other 627 being hired by societies from the owners.

The average prices paid for bulls were as follows: £54 18*s.* 9*d.* for Shorthorns; £52 18*s.* 11*d.* for South Devons; £52 9*s.* 2*d.* for Devons; £51 10*s.* 9*d.* for Lincoln Reds; £50 13*s.* 5*d.* for Herefords and £37 6*s.* 6*d.* for Welsh Blacks. The highest price paid was £157 10*s.* for a Hereford. The service fees varied from 2*s.* 6*d.* to 10*s.* 6*d.*

Of the bulls located, 461 were Shorthorn, 73 Hereford, 64 Lincoln Red, 51 Devon, 38 Welsh Black, 13 South Devon, 2 Aberdeen Angus, 3 Guernsey, 3 Jersey and 2 Sussex.

Grants for Heavy Horses.—This section of the Scheme continues to be well supported, but it cannot be further developed until further funds are available for the purpose. It is satisfactory to be able to record that several of the societies which were formed four years ago, and started with one stallion, now arrange to travel two or three, and in one case four sires. Hiring fees have risen, but useful sound sires can still be had for £250–£300 the season, and they are of sufficiently high standard to encourage many members to purchase pedigree mares for mating with them. A few of the more progressive societies under the Scheme now hire stallions which are not subsidised, as they are travelled at fees exceeding the maximum (£3 3*s.*) authorised by the Board. Such development is good testimony to the educational value of the Scheme, and it is hoped that it will soon be the general rule and not the exception for societies to travel two grades of sires, one for the service of pedigree or high-class mares at four or more guineas, and the other for lower-grade mares at a fee of £2 10*s.* to £3 3*s.*

The "payment by results" system of hiring stallions appears to be growing in favour. It is certainly sound in principle and advantageous to mare owners, and also to owners of stallions that are good getters.

The number of subsidised societies during the year was 94 with 110 stallions, as compared with 93 societies with 108 stallions in 1916. The number of mares served by the 110 stallions was 10,556, an average of 96 per stallion. Assisted nominations (*i.e.*, payments not exceeding one-half the normal service fee) were paid by the Board in respect of 2,151 of the above mares. These figures do not include the 328 mares in favour of which assisted nominations were issued by the Cumberland and Westmorland Heavy Horse Society for service by 40 selected stallions.

The average hiring fee of the stallions was £258, and the average service fee charged was £2 16*s*. as compared with £244 and £2 11*s*., respectively, in the previous year.

Milk Recording Societies.*—The present price of milk as compared with the pre-war price accentuates the difference between a good and an indifferent dairy cow as a source of revenue. With milk at 1*s*. 6*d*. a gal. the gross income from an 800-gal. cow is £60 a year, whereas it is only £30 from a 400-gal. animal—and there are many of the latter in the dairy herds of the country.

The yields of cows belonging to members of milk recording societies subsidised by the Board show a wide variation. Comparing the average yields of cows that have been in herds for a full year the returns show the highest average yield of a society to be 7,342 lb., and the lowest 4,564 lb—a difference of 271 gal., or of £20 in cash per cow a year, between the value of the produce from the herds of the best and worst of the societies.

Facts like these should convince dairy farmers of the importance of keeping accurate and checked records of the yields of their cows, so that they may be able to ascertain with certainty the annual cash-producing value of their stock-in-trade, and to discard the unprofitable animals.

Under the Board's Scheme milk yields are checked by recorders who pay surprise visits not less frequently than once in six weeks, and the commercial advantage of this independent supervision and checking is of the greatest value to dairy farmers—it goes a long way towards preventing errors arising from mistakes or carelessness on the part of the milkers, or other persons who are primarily responsible for taking the records, and it furnishes a guarantee—so far as one is possible—of the accuracy of the yields.

* See also Leaflet No. 146, to be obtained post free on application.

In course of time it is hoped that a farmer, when he buys a dairy cow, will insist on having a guarantee of her milk-producing powers, *i.e.*, a certified record of her annual yield. He requires a guarantee of the horse-power of a steam or oil engine before he purchases it, and as he cannot form any reliable estimate from the appearance of a cow of her capacity as a milk producer, it seems only reasonable to require the vendor to produce evidence as to this essential qualification.

Having made arrangements for determining the annual milk yield of his herd the next step for the farmer to take, if he is to carry on his business on commercial lines, is to ascertain the cost of producing the milk, and for this purpose provision is made by the Board in their Regulations for assistance and advice to be given by Live Stock Officers on questions relating to economic feeding and rations.

Milk recording is in its infancy in this country. It is an innovation and as such is regarded with suspicion by many farmers. Its advantages are not immediately apparent, but the little extra labour and the small cost it involves are repaid many times over by the results obtained. In districts, however, where Milk Recording Societies have been in operation for two or three years, it is evident that many of the members are beginning to realise the value of taking records and of using a bull of milking strain. As evidence of this a Live Stock Officer recently reported that he accompanied eight members of societies in his province to purchase bulls for use in their herds, and the sires selected cost 310, 210, 185, 166, 155, 140, 133 and 120 guineas respectively. Another society consisting of 36 members has agreed that at the close of the present milk-recording year its members will use none but pedigree bulls in their herds.

These examples indicate satisfactory development and improvement, and, notwithstanding the adverse conditions now prevailing, the number of societies during the year under review increased from 22 to 25 with 503 members owning 555 herds and 14,404 cows. The number of certificates issued was 2,189 as compared with 834 in the previous year. The highest yield certified was one of 19,646 lb.. and the cow with this extraordinary record was recently sold for 3,500 guineas.

Dairy Register.—An important development of the Milk Recording Scheme is the issue of a Dairy Register by the Board. The first volume has been published recently, and contains particulars and records of cows which yielded during the year ending 30th September last not less than

8,000 lb. of milk, and in respect of which certificates have been issued by the Board. There are 572 entries in the first volume, and the number of cows of the various breeds or types are as follows: 396 Shorthorn, 60 Lincoln Red, 58 British Friesian, 45 Crossbred, 10 Red Poll, and 3 of other breeds.

In addition to those whose yields are 8,000 lb. of milk or over, cows will be eligible for entry in future issues of the Register if their average yield for two consecutive years is not less than 6,500 lb.

The following are the principal memoranda and forms used in connection with the live-stock operations of the Board, and copies of them can be obtained free of charge on application to the Secretary, Board of Agriculture and Fisheries, Whitehall Place, London, S.W. 1 :—

L. 1.—Memorandum on the Live Stock Scheme.
L. 2.—Regulations as to Bull Grants.
L. 3.—Regulations as to Heavy Horse Grants.
L. 4.—Memorandum and Regulations as to Milk Record Grants.
L. 11.—Regulations as to Boar Grants.

AN EXPERIMENT IN WAR TIME BEEF PRODUCTION.

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THE experiment, of which an account is given below, originated at a meeting between Dr. R. B. Greig of the Scottish Board of Agriculture, Mr. J. R. Campbell, of the Irish Department of Agriculture, and the writer, at which the minimum amount of cake required for winter beef production was discussed. A study of the literature showed practically only one direct experiment on the subject, namely, an experiment carried out at the Norfolk Agricultural Station in 1908, when 10 steers on a ration of 1½ cwt. roots, 10 lb. chaff, and 1 lb. cotton cake per head per day, were found to increase in live weight at the rate of 1¼ lb. per head per day for 20 weeks, during which period they produced 78 tons of dung which was found to produce an excellent crop of mangolds when applied to the land at the rate of 10 tons per acre.

In view of the prospective shortage of cake, it was considered highly desirable to obtain more general information on this subject, and arrangements were made for carrying out feeding trials on beef production with a low cake ration in England, Scotland and Ireland. Accordingly, a scheme was prepared and trials were carried out at two stations in Norfolk, two stations in Scotland and three stations in Ireland.

The idea of the experiment was to feed a number of 2½-year-old steers on as many roots and as much straw as they would eat, supplemented with only 1½ lb. per head per day of undecorticated cotton cake. It was also considered desirable that, where possible, the weights of litter consumed and of dung produced should be recorded, and that the animals should be slaughtered under such conditions that their carcass weights could be determined.

Outside these points, full discretion was left to the experimenters to adopt the ordinary practice of their district. Accordingly, the methods of feeding do not agree in every detail, but the results may be taken to show the extent to which 2½-year-old steers will increase in live weight on a cake ration of 1½ lb. when fed otherwise according to local English, Scotch and Irish practice.

Looked at in this way, it is allowable to collect all the results into one table and to attempt to draw lessons from them as a whole, in spite of the variations in detail of the feeding and management.

Before this can be done, however, it may be advisable to state briefly how the trial was carried out at each centre.

Norfolk Agricultural Station, Little Snoring.—The 20 Irish steers, about 2½ years old, bought in Ireland by Mr. Josias Cunningham of Belfast, were weighed the day after arrival and at once put upon the prescribed ration of roots, straw, hay and cake. The roots consumed were swedes for the first 12 weeks, for the thirteenth week swedes and mangolds mixed, and thereafter mangolds only. Cut oat straw was given and some good long hay. Barley straw was used for litter, and no doubt the animals picked out what they liked of it. The animals were housed in closed boxes.

All the animals were weighed and sold on the same day at the local market (Fakenham), the weights given being taken from the sale tickets. On acconnt of scarcity of labour it was impossible to weigh either the litter or the dung, but from former trials it is probable that the litter amounted to nearly 30 lb. of straw per head per day, or a total of 35 tons, and the dung produced to rather more than 1 cwt. per head per day, or a total of 140 tons.

Half the animals were graded super, and half first grade. Six animals were followed to the slaughter-house in London, where they were found to yield from 54 to 57 per cent. of dressed carcass, averaging 55 per cent.

Field Dalling.—There was no weighbridge at this centre, and the weights given are taken from the weighbridge tickets at the port of shipment in Ireland and the sale tickets at the local market (Holt). Of the 20 animals, 13 were placed in the super grade, and 7 in the first grade. The animals, Irish 2½-year-old steers, were put on the prescribed rations immediately on arrival—roots, oat straw chaff and cake. For the first 9 weeks the roots were swedes, then followed one week of mixed swedes and mangolds, after which mangolds only were given. The animals were housed in a covered yard, and sold as they were judged to be ready, the average duration of feeding being 18 weeks. It was impossible to weigh either litter or dung, but the estimated amounts are :—

Litter, barley straw .. .. .. 32½ tons.
Dung .. .. 126 ,,

Spencerfield.—The animals were Irish steers, similar to those used at the other stations, but they were kept nearly a month, partly on pasture and partly on roots and straw before being put on the experimental ration. The weights given are taken from weighings at the station at the beginning and end of the experimental period. This, no doubt, tends to scientific accuracy, but the method used at the Norfolk stations gives a better measure of the economic result. The roots used throughout the experimental period were swedes. Long oat straw was given, and the standard ration of 1½ lb. of cake. The litter used and the dung produced were weighed, with the following result :—

Litter used .. .. 4 tons 1 cwt.
Dung produced .. .. .. 39 ,, 3 ,,

The animals were sent by rail to Edinburgh at the end of the experimental period and lost in transit 58 lb. per head, or 4¾ per cent. of their live weight. The experiment was conducted by Mr. W. Bruce, B.Sc., of the Edinburgh and East of Scotland Agricultural College.

The experiments were under the direction of Professor Hendrick.

Craibstone.—Two trials were made here, one with Irish steers similar to those used elsewhere, and a second with home-bred steers. The weights given are taken from weighings made at the farm on the first and last days of the experiment. As at Spencerfield, the animals were kept for about 3 weeks after arrival on a ration of turnips and straw before the trial commenced.

The roots used were yellow turnips for the first 6 weeks of the trial and swedes for the rest of the period. Oat straw was used for feeding. The amount of litter was 7 tons 6 cwt. of straw, and the weight of dung produced was 52 tons.

The cattle were marketed as they were considered ready, the average duration of feeding being 14 weeks in the case of the Irish steers and 18 weeks in the case of the home-breds. The average loss in live weight between the last weighing on the farm and the weighings made immediately before slaughter, after travelling, was 5½ per cent.

Ballyhaise.—The cattle were Irish steers. Swedes were used throughout the trial, but the supply gave out at the end of 12 weeks, when the trial had to be stopped and the animals slaughtered. Hay was used in place of straw. The animals were tied up in stalls and the dung removed daily and heaped up. This greatly reduced both the

litter used and the dung produced, because the urine from the cattle was not absorbed by the litter, but allowed to drain into a liquid-manure tank. The actual amount of litter supplied was 7 lb. per head per day, or a total of 2 tons 2 cwt. The dung produced was 40 lb. per head per day, or a total of 12 tons, exclusive, of course, of the liquid manure. The weighings given are those taken at the beginning and end of the trial.

Athenry.—Irish steers were used. The roots were swedes at first, and later mangolds. Oat straw was fed and no hay. The cattle were housed in covered sheds. The amount of litter used was 28 lb. per head per day, or a total of 11 tons 4 cwt. The dung produced was 134 lb. per head per day, or a total of 53 tons 12 cwt. The animals were sold for slaughter as they were considered to be fit, the average duration of feeding being 15 weeks.

Glasnevin.—The cattle used were Irish steers. The ration included mangolds, oat straw, and a little hay and the standard allowance of cake. The animals were housed in covered sheds. The litter supplied was 13 lb. per head per day, or a total of 7 tons 14 cwt. of straw. The dung produced was 82 lb. per head per day, or a total of 48 tons 14 cwt. The weighings given are those made at the beginning and end of the trial. The animals were weighed again immediately before slaughter, and showed a loss in transit of nearly 8 per cent.

Results.—Particulars of numbers of cattle employed, duration of feeding, rations, increase in live weight, yield of carcass, litter supplied and manure produced, are given in Table I.

Although the feeding and treatment were not identical in every case, so that the results cannot be strictly averaged, they show quite clearly that stores about 2½ years old, provided they get an abundance of roots and good straw or hay will. on as low a cake ration as 1½ lb. per head per day of undecorticated cotton cake, increase in weight at the rate of about 10 lb. per head per week, and in 15 to 20 weeks will produce a yield of about 56 per cent. of dressed carcass, which entitles them to be placed in the first grade. At the same time, they will produce if kept in covered yards about 7 tons of dung per head during the feeding period.

Five of the results are extraordinarily uniform, the increase in live weight being at the rate of 8 to 10 lb. per head per week. In two cases, namely at the Norfolk Agricultural Station and at Athenry this rate was greatly exceeded, possibly in the first case because the animals got a fair ration of good long hay. At Glasnevin, the rate of increase was considerably smaller, possibly on account of the small ration of roots. On the whole, the trials show that with a liberal allowance of roots and either good oat straw or hay, supplemented by a ration of 1½ lb. of cake per head per day, an average increase in live weight of about 1¼ lb. per head per day may be relied upon in

the case of good quality steers 2½ years old or over. Whether younger animals would give similar results remains still in doubt.

It is important to compare these results with those obtained with pre-war feeding, when much larger cake rations were commonly used.

In the experiments carried out last winter, 95 store cattle weighing 910 cwt. 2 qr. 2 lb. produced fat cattle weighing 1,080 cwt. 2 qr. 19 lb., or a store beast weighing on the average 9 cwt. 2 qr. 9 lb. produced a fat beast weighing 11 cwt. 1 qr. 14 lb. The average yield of dressed carcass was 56 per cent., so that 11 cwt. 1 qr. 14 lb. yielded 6 cwt. 1 qr. 14 lb. of dressed meat.

In a series of experiments carried out in Norfolk during the years 1896 to 1899, 56 store cattle weighing 507 cwt. 10 lb. yielded fat cattle weighing 622 cwt. 1 qr. 6 lb. The average yield of dressed carcass was 59·5 per cent. From these figures a store beast weighing 9 cwt. 6 lb. produced a fat beast weighing 11 cwt. 13 lb., yielding 6 cwt. 2 qr. 14 lb. of dressed meat.

In last season's experiments, the average duration of feeding was 17 weeks and the cake ration 1½ lb. per head per day. In the earlier experiments the average duration of feeding was 19 weeks and the average cake ration 8 lb. per head per day. The total cake consumed per head in the two cases was, therefore, 178½ lb. and 1,064 lb. respectively.

For comparative purposes, the above figures have been recalculated on the basis of a store beast weighing 1,000 lb. :—

	Total Cake Consumed.	*Weight of Store.*	*Weight of Fat Beast.*	*Weight of Meat.*
1918	178½ lb.	1,000 lb.	1,187 lb.	665 lb.
1896-9 ..	1,064 ,,	1,000 ,,	1,228 ,,	731 ,,

On last year's low cake ration, 178½ lb. of cake resulted in the production of 655 lb. of meat. On the pre-war Norfolk cake ration of 8 lb. per head per day, 1,064 lb. of cake produced a further 66 lb. meat.

In these days of difficult importation, there can be no question that the low cake ration should be generally adopted. According to the above figures, the decrease in cake consumption from 8 lb. per head per day to 1½ lb. per head per day only reduced the live weight produced by 3·3 per cent. and the meat by 9 per cent.

From the point of view of profit, the high cake ration was also a mistake. For each extra pound of beef produced 13 lb. of cake, costing about 2*s.*, was consumed.

At the Scotch stations duplicate lots of cattle were fed on roots and straw without cake for comparison with the lots getting 1½ lb. of cake in addition.

TABLE I.

Name of Station.	No. of Cattle.	Length of Feeding Weeks.	Ration per Head per Day.				Average Live Weight at Beginning.	Average Live Weight at End.	Average Gain.	Av. Gain. per Week.	Yield of Dressed Carcass per cent. of Live Weight.	Litter Supplied per Head.	Manure Made per Head.
			Roots.	Straw.	Hay.	Cake.							
			lb.	lb.	lb.	lb.	c. q. lb.	c. q. lb.	c. q. lb.	lb.	Per cent.	T. c.	T. c.
Little Snoring, Norfolk..	20	20	170	3	5	1½	9 1 7	12 1 10	3 0 3	17	55	1 15*	7 0*
Field Dalling, Norfolk ..	20	18	180	5½	—	1½	10 0 0	11 2 19	1 2 19	10	—	1 12½*	6 6*
Spencerfield, Scotland ..	9	18	120	16	- -	1½	0 2 24	11 0 1	1 1 5	8	53	0 9	4 7
Craibstone, Scotland (Irish cattle)	10	14	88	14	—	1½	9 1 7	10 2 1	1 0 22	9	58	0 7¼	2 12
Craibstone, Scotland (Home-bred cattle) ..	10	18	91	13½	—	1½	0 3 3	11 1 16	1 2 13	10	57		
Ballyhaise, Ireland ..	8	12	92	—	18	1½	9 0 14	10 0 24	1 0 10	10	—	0 5¼†	1 10†
Athenry, Ireland ..	8	16	166	8	—	1½	9 1 9	11 2 4	2 0 23	15½	—	1 8	6 14
Glasnevin, Ireland ..	10	19	95	14	—	1½	9 3 9	10 3 6	0 3 25	5¾	57	0 15½	4 17½

* Estimated from former experiments. † Animals kept in tie-up stalls.

It is impossible to compare the results obtained with roots and straw with the above figures, for the roots and straw results refer only to about half the cattle. Comparing the cake and no cake lots, which were fed side by side, the use of 1½ lb. of cake per head per day resulted in an increased production of meat of about 5 per cent.; but no great reliance can be placed on this figure as it is based on the results of only a small number of animals.

It is certain that with an allowance of 1½ to 2 cwt. of cake per head of cattle to be fattened next winter, beef can be satisfactorily produced. The yield of meat will probably be within 10 per cent. of the yield which would be obtained if a normal ration of cake were available.

If no cake at all can be allowed for beef production, the Scotch results suggest that beef can still be produced from roots and straw, but the yield of meat is likely to be reduced by a further 5 per cent. or by a total of 15 per cent. below the yield if a normal ration were available.

Economic Results.—The results may also be considered from the economic standpoint, for which purpose complete figures are available for the two Norfolk experiments. These figures include the cost of the cattle, the cost of the cake, and the amount realised by the sale of the cattle. Fortunately, too, the writer is in possession of complete figures for the cost of production of the home-grown foods on one of the farms. These are given below:—

Cost of Production of Home-grown Foods.

Mangolds: 10 acres grown in 1916.	£	*s.*	*d.*
Rent and rates	14	3	9
Labour	21	6	8
Horse labour	21	13	0
Manures and seed	54	3	10
Small items	1	0	5
General expenses; including share of management, depreciation of implements, etc... ..	7	18	4
	£120	6	0
Less share of manurial residue and tillage carried forward to next crop	4	16	10
Cost of growing 10 acres	£115	9	2
Cost per acre	£11	11	0

Assuming that the crop was 16 tons per acre, the average crop in Norfolk according to the Board of Agriculture returns, the cost per ton works out at 14*s.* 9*d.*, or, say, 15*s.*

Swedes : 26½ acres grown in 1916.

	£	s.	d.
Rent and rates	37	12	0
Labour	42	4	0
Horse labour	55	3	10
Manures and seed	30	3	9
Small items	2	10	10
General expenses: including share of management, depreciation of implements, etc... ..	12	5	1
	£179	19	6
Less share of manurial residue and tillage carried forward to next crop	15	3	5
Cost of growing 26½ acres	£164	16	1
Cost per acre	£6	5	0

Assuming that the crop was 12 tons per acre, the average crop in Norfolk according to the Board of Agriculture returns, the cost per ton works out at 10*s.* 6*d.*

Seeds Hay : 24½ acres grown in 1916.

	£	s.	d.
Rent and rates	33	15	3
Labour	12	3	7
Horse labour	10	4	3
Seed	12	12	0
Share of tillage, etc., of preceding crop brought forward	35	7	6
Small items	2	10	10
General expenses: including share of management, insurance, depreciation of implements, etc.	7	10	11
	£115	4	4
Less share of manurial residue etc., carried forward to next crop	17	13	9
Cost of growing 24½ acres	£97	10	7
Less aftermath charged to sheep	26	1	0
Cost of 24½ acres of hay	£71	9	7
Cost per acre	£2	18	0

Assuming that the yield of hay was 25 cwt. per acre, the average according to the Board of Agriculture returns, the cost per ton works out at £2 6*s.* 5*d.*

Oat Straw :—22 acres grown in 1916.

	£	s.	d.
Rent and rates	33	0	0
Labour	35	8	9
Horse labour	15	5	0
Seed	11	0	0
Thrashing	10	18	2
General expenses: including share of management, insurance, depreciation of implements, and manures	19	0	6
Total	£124	12	5

To determine the separate cost of the straw the following method was adopted: The 22 acres produced 168 qr. of grain and 22 tons of straw. The average market prices for oats and oat straw in 1916 were for oats 40s. per qr., and for oat straw 30s. per ton. The market value of the total produce was, therefore—

	£
168 qr. oats at 40s.	336
22 tons straw at 30s.	33
Total	£369

The market value of the straw was, therefore, almost exactly one-eleventh of the market value of the total produce. Assuming that the cost of production is also shared between grain and straw in this proportion, the cost of production of 22 tons of straw is one-eleventh of £124 12s. 5d., or £11 3s. 10d. (*i.e.*, 10s. per ton).

Barley straw works out at exactly the same figure.

It appears, therefore, that the cost of production of home-grown foods at one of the Norfolk stations in 1916 was as follows:—

	Cost of Production per Ton. £ s. d.
Mangolds	0 15 0
Swedes	0 10 6
Seeds hay	2 6 5
Oat and barley straw	0 10 0

Unfortunately, the actual costs of production for 1917 are not available, but it is certain that between these two seasons labour, seed manures, and in fact all items except rent, had risen, and must have increased the cost of production. On the assumption that all items, except rent, had risen between 1916 and 1917 by 33 per cent., then the cost of production in 1917 becomes—

	Cost of Production per Ton. £ s. d.
Mangolds	0 18 6
Swedes	0 13 0
Seeds hay..	2 14 0
Oat and barley straw	0 13 0

These figures cannot pretend to possess any general accuracy, since the greatest factor in determining them is the yield per acre. It costs as much to produce a bad crop as a good one.

In these circumstances, it seems advisable to round off the figures as follows:—

Estimated Costs of Production per Ton, 1917.

	£	s.	d.
Mangolds	1	0	0
Swedes	0	15	0
Seeds hay	2	15	0
Oat and barley straw	0	15	0
Oat straw chaff	1	0	0

Adopting these figures, the financial results of the two Norfolk experiments work out as follows:—

Norfolk Agricultural Station, 1917.

	£	s.	d.		£	s.	d.
To cost of 20 bullocks, 186 cwt. 2 st. (68*s.* 4*d.* per cwt. on the farm) ..	636	17	6	By sale of 20 bullocks, 246 cwt. 7 st. (75*s.* 6*d.* per cwt.)	932	3	7
Cost of 131 tons 13 cwt. swedes at 15*s.* per ton ..	98	15	0	Value of 140 tons dung at 10*s.* per ton	70	0	0
Cost of 95 tons 10½ cwt. mangolds at 20*s.* per ton	95	10	0				
Cost of 3 tons 16½ cwt. oat straw chaff at 20s. per ton	3	17	0				
Cost of 6 tons 3½ cwt. long hay at 55*s.* per ton	17	0	0				
Cost of 1 ton 17½ cwt. cotton cake at £16/12/6 per ton	31	5	0				
Cost of 35 tons barley straw for litter at 15*s.* per ton	26	5	0				
Cost of labour at 1*s.* 6*d.* per head per week ..	30	0	0				
Profit on feeding ..	62	14	1				
	£1,002	3	7		£1,002	3	7

The above figures show that if the dung is valued at)*s.* per ton, the 20 weeks' feeding of 20 cattle resulted : a profit to the farm of £62 14*s.* 1*d.* To this result vo factors chiefly contributed. In the first place, the ıttle were bought at 7*s.* per cwt. below the selling price. econdly, the rate of increase, 17 lb. per head per week, was cceptionally high.

Field Dalling.

	£	s.	d.		£	s.	d.
To cost of 20 bullocks, 200 cwt. (72s. 2d. per cwt. on the farm)	721	11	2	By sale of 20 bullocks, 233 cwt. 3 st. (75s. 9½d. per cwt.)	884	11	3
Cost of 112 tons swedes at 15s. per ton ..	84	0	0	Value of 126 tons dung at 10s. per ton	63	0	0
Cost of 90 tons mangolds at 20s. per ton ..	90	0	0	Loss on feeding..	34	8	6
Cost of 6 tons oat straw chaff at 20s. per ton ..	6	0	0				
Cost of 1¾ tons cotton cake at £16 12s. 6d. per ton	29	1	10				
Cost of 32½ tons barley straw for litter at 15s. per ton	24	6	9				
Cost of labour: 18 weeks at 1s. 6d. per head per week	27	0	0				
	£981	19	9		£981	19	9

The Field Dalling trial was evidently not so satisfactory from a financial point of view. No profit was made, and if the whole expenses are charged to the dung it cost £97 8s. 6d. for an estimated quantity of 126 tons, which works out at 15s. 6d. per ton. This seems a high cost for dung, but the writer, who has kept accounts for many years on the lines shown above, has known dung to cost as much even before the War. It will be noticed that the bullocks fed at Field Dalling cost as stores 72s. 2d. per cwt., or 3s. 10d. per cwt. more than the bullocks fed at Little Snoring. This difference in price amounts to £38 6s. 8d. on the 20 bullocks. If the Field Dalling stores had been bought at the lower price, the cost of the dung per ton would have been reduced to less than 10s. per ton, which is not an unreasonable price with wheat at its present level. This serves to show the predominant importance of the price of the stores in determining the cost of production of beef. The following table illustrates this point in the case of the Norfolk stations:—

Items in Cost of Production of Beef.

	Little Snoring.		*Field Dalling.*		*Average.*
Cost of stores ..		67·7		73·5	70·6
Cost of food:—					
Roots	20·7		17·7		
Straw	·4		·6		
Hay	1·8		—		
Cake	3·3		2·9		
		26·2		21·2	23·7
Cost of litter ..		2·9		2·5	2·7
Cost of labour ..		3·2		2·8	3·0
		100·0		100·0	100·0

This table shows that the cost of the stores amounted to about 70 per cent. of the cost of the finished animal and was, therefore, by far the largest item in the cost of beef production. The most important point, therefore, in producing beef is to be able to buy stores at a reasonable price. The Little Snoring cattle were bought at 7*s.* per cwt. below the selling price, the daily increase was exceptional, and a profit was made. The Field Dalling stores cost only 3*s.* 6*d.* per cwt. less than the selling price. they made a more usual rate of increase, and, in consequence, the dung they made worked out at a very high price. If stores can be bought somewhere between these two prices, say, at 5*s.* per live cwt. below selling price for beef, economic feeding should result in the production of dung at a reasonable price.

The food is the next most important item, costing even on the low cake ration used nearly 24 per cent. of the whole cost of production.

Labour and litter are both small items, amounting to about 3 per cent. each.

It is, of course, desirable to economise in food and in labour, but by far the most important point is to economise in buying the stores, which should cost at least 5*s.* per live cwt. less than the price at which the finished animals will be sold.

THE NEED FOR CAUTION IN THE FEEDING OF LIVE STOCK UNDER PRESENT CONDITIONS.

DIFFICULTIES of food-supply are to-day common to both man and beast. In the past days of abundant supplies certain foods, such as the cereal and pulse grains, served equally for both, but in the present conditions of relative scarcity the needs of human nutrition leave little margin of such foods for the use of live stock. Moreover, certain other feeding-stuffs which were formerly imported in large quantities are now available only in greatly diminished amount, with the result that the total supplies of concentrated feeding-stuffs available for live stock are probably barely half those available in the days of peace.

There is no need to enlarge upon the difficulties which this shortage has occasioned to owners of live stock, but it is desirable to emphasise the increased obligation placed upon them for the exercise of the greatest care in the modification

of rations, and particularly in the hardly avoidable introduction of little tried, or possibly untried, new feeding-stuffs.

Materials are now finding use as feeding-stuffs which before the War were entirely unknown as such to the farmer, although many of them served as ingredients of proprietary compound cakes and meals. Some of these less familiar materials, though not in common use here before, are well proven and known to be generally satisfactory, but, as the deficit of food supplies has increased, there has been a growing tendency to add to the list materials of very doubtful feeding value, if not indeed actually injurious to stock.

In view of the increasing difficulties with which manufacturers of feeding-stuffs have been confronted during the War, it is hardly to be wondered at that the average quality of animal feeding-stuffs is now considerably below that of pre-war days. Cases are frequently reported of materials being sold as feeding-stuffs which on examination prove to be, if not entirely worthless, at least extremely poor value for the price charged. As an example may be cited the case of a "horse mixture," certified by Professor Wooldridge, of the Royal Veterinary College, to be essentially "oat and barley husks, chopped straw, and meagre traces of hay; complete absence of corn or grain of any kind."

Apart from this increase in the sale of low-grade materials there are signs of increase in losses of stock by poisoning due to the use of materials either entirely unsafe to feed or usable only in relatively small quantity. This has unfortunately been the case, for example, in the use of rape cake, especially when contaminated by mustard seed. The risk of poisoning by the use of such cake was well recognised many years ago, and led to the disuse of rape cake for feeding, except as an ingredient of compound cakes. Trouble has also been experienced recently in the use of sesame cake, in which the poisonous ingredient is oxalic acid. In both cases the experience of different farmers supplied from the same consignment of cake has varied greatly, many having observed no ill effects on their stock. This suggests that in the cases where trouble has arisen the rape or sesame cake may have been fed in unduly large quantities or otherwise so injudiciously dealt with as to afford special opportunities for the development of the injurious principles lying dormant in these materials.

A few cases of trouble do not warrant a wholesale condemnation of these feeding-materials, since the consignments which

have caused trouble represent only a small fraction of the total consumption, and in the great majority of cases no such trouble has been experienced.

The same cannot be said, however, with regard to the feeding of castor-oil beans to stock, which has recently been the cause of many cases of poisoning of horses. It cannot be too strongly emphasised that castor-oil beans are entirely different from ordinary beans and must on no account be fed to stock of any description. This does not necessarily apply to the castor meal from which the oil has been removed at a high temperature. This is said to be safe to use, but the prudent man will proceed cautiously in feeding it until satisfied that it is harmless.

The foregoing examples illustrate clearly the need for increased care on the part of the stock-owner if losses of stock are to be prevented. Various suggestions for attaining greater security in this direction were recently put forward in a letter to *The Times*, by Professor G. D. Lander, D.Sc., of the Royal Veterinary College, and are embodied in the following paragraphs :—

1. In purchasing feeding-stuffs all possible information as to the real nature of the material should be obtained before the order is placed. It is not sufficient to have a guarantee of the contents of albuminoids, oil, etc., since such figures give no assurance that deleterious ingredients are not present.

2. The user should avail himself to the full of the services of the district agricultural analyst and of the expert advice obtainable gratis from the County Organiser or Agricultural College in his area. All material of unusual appearance, especially foreign grains or seeds, should be submitted to qualified experts for identification before being used.

3. In general, low-priced material should be avoided unless there is clear evidence that it is good value. Most of the trouble reported in the use of purchased feeding-stuffs arises from the use of low-priced material. Such material is generally either low-grade material or damaged high-grade material, and in either case can rarely give satisfaction to the user.

4. It is useless to try to make up for bad food by dosing with " alterative " or " condition powders," many of them dangerous. No amount of medicine will

make good the lack of nutritious elements in the food. The safest, and probably most economical plan, is to discard such food entirely.

5. Changes of diet should be made gradually, especially where they involve the introduction of new foods. Animals are generally suspicious of new foods and often reject for a while material which they subsequently eat readily. This is a very common experience with palm kernel cake, and the impatient farmer who rejects it on a few days' unfavourable experience will deny himself one of the most useful and most abundant feeding-stuffs at present available.
6. In the case of an entirely new food of unknown feeding characteristics, it is only common prudence to try it first on a single isolated animal, and that the least valuable.
7. The risk of trouble is considerably reduced by using a mixture of concentrated foods, instead of restricting the animal to a single one. There are other sound reasons for making this a general practice, and it should be the invariable rule in using foodstuffs that have not been widely used and found quite safe. In the case of cattle, cows or horses, caution is generally needed—certainly in the case of new foods—in increasing the amount of any one feeding-stuff beyond 2 or 3 lb. per day. For sheep and pigs the corresponding limit is roughly ½ lb.

The farmer should remember that in using a new or hitherto untried food he is really carrying out an experiment and must proceed therefore by gradual stages, watching the effects at each stage before passing on to the next. So long as supplies of feeding-stuffs remain short, and the farmer is often compelled to take what is offered rather than what he would like, so long must risks be taken which would be avoided in normal times, and the only safe way to reduce these risks is to exercise correspondingly greater care in purchase and to have recourse to experimental methods in use.

(NOTE.—*This article is also issued as Food Production Leaflet No.* 49. *Copies may be obtained post free on application.*)

RABBIT KEEPING.

THE objects of this article are to give reasons why rabbits should be kept by everyone who has the necessary and very simple means of rearing them, and to show how the keeping of rabbits may be economically and successfully carried on by amateurs who have had no previous experience in rearing them.

The chief reasons why it is important that the stock of rabbits in the country should be largely increased is that if this is done a large supply of meat will be available to supplement the present short rations.

As indicating the amount of food which may be produced by rearing rabbits for the table, it may be mentioned that the total weight of the progeny produced in the two breeding seasons by a healthy doe mated with a healthy buck is not less than 1 cwt. Furthermore, it should be borne in mind that rabbit flesh at the present time is a particularly valuable food, because of its richness in nitrogenous or flesh-forming food substances.

The only drawback to rabbit flesh as an article of food lies in the relatively small quantity of fat which it contains. For this reason the best course that can be followed by all who are able to adopt it is to combine rabbit-keeping with pig-keeping, for the fat supplied by the one animal supplements the nitrogenous food supplied by the other. Rabbit flesh and bacon together will supply a meal as rich in food as is beef or mutton. For example, 3 lb. of rabbit and 1 lb. of bacon would provide more nitrogenous and fatty food than is provided by 4 lb. of beef.

One of the greatest advantages of rabbit-keeping is its small cost. Of all the food-producing domestic animals the rabbit is the one which thrives on the simplest food, and indeed during seven months of the year its food should cost nothing beyond the trouble of collecting it. In winter the cost of food of an adult rabbit, even where all of it has to be bought, should not exceed 3*d*. per week.

The accommodation which rabbits require is of the simplest, and a sugar box in a back yard will make a thoroughly satisfactory hutch, provided that it is weather- and draught-proof, and well ventilated.

No one need be deterred from keeping rabbits by lack of expert knowledge, and by following the advice here given any amateur should be able to rear rabbits for the table. An amateur should begin with young rabbits, for to breed rabbits

profitably requires great care, and should not be undertaken until experience in keeping rabbits has been gained.

BREEDS OF TABLE RABBITS.—The breeds which are to be classed as table rabbits are :—Flemish Giant, Belgian Hare, Silvers, English, Blue Beveren, Black and Tan, Himalayan, Imperial, Japanese, Havana, Polish, and Dutch.

Angoras, which are also classed among the utility breeds, are chiefly reared for their valuable fur and "wool" which form in France the raw material of an important home industry.

There is no "best breed" of table rabbit.

The best table rabbit is that which produces the greatest amount of meat in the shortest time at the lowest cost, and therefore the "points" of a first-class table rabbit are :—

1. Hardiness of constitution.
2. Prolificness. (This does not mean so much the production of large litters as the ability to rear a large number of strong and healthy young).
3. Early maturity (quick growers).
4. Economic feeding (quick growers and small eaters).
5. Compact body.
6. Small bones.
7. Minimum of offal in "dressing" for the market.

Expert rabbit-keepers seek to secure these points by crossing suitable breeds. Some breeders believe in a cross between two of the large breeds as the ideal table rabbit. Others reject this cross on the ground that the offal at the killing age (bones, intestine and skin) is high, and prefer medium breeds because they are small eaters, mature early, and are close bodied, firm fleshed and small boned, with the *minimum of offal*. They point out, for instance, that while the Dutch is a small rabbit, the percentage of offal in its carcass is lower and that of meat is higher than in the large breeds.

As favourite crosses may be mentioned :—

Belgian Hare Doe	by Flemish Giant Buck.
Flemish Giant, Silver Doe, or any Doe of the medium breeds ..	" Belgian Hare Buck.
Flemish, Belgian or English Doe ..	" Silver Buck.
Flemish, Belgian Hare, or Silver Cross	" Blue Beveren.

Under existing circumstances, however, it is no longer a question of favourite crosses, but of getting any breeding stock at all. Those who intend to take up the breeding of rabbits or increase their breeding stock should obtain does of any of the breeds mentioned, including any from the above crosses, provided the does are healthy and of hardy constitution. The doe should be mated with a Pure-bred Flemish Giant, Belgian Hare or Silver Buck. The service of such bucks can be obtained

at the nearest Stud Rabbit Centre. *A list of these centres can be obtained on application to the Secretary of the County Horticultural Sub-Committee* or to the Food Production Department, 72, Victoria Street, London, S.W. 1.*

BREEDING.—*Breeding Stock.*—The buck should be strong, with hard and firm flesh, and a fine, vigorous appearance. The doe should be lean and firm fleshed, with a coat in perfect condition.

Breeding Age.—Bucks (of all breeds) reach breeding ages at about nine months. Does—Dutch, Polish, and Himalayans—at six months; Flemish Giants, eight months; all other breeds, seven months.

Mating.—For mating use a young buck with an older doe, or a young doe with an older buck.

"*Season.*"—A doe indicates her readiness to be mated by general restlessness, stamping the floor with her hind feet, trying to burrow in the corner of the hutch, plucking fur from her chest, and carrying about bits of hay.

As soon as these signs are noted the doe should be placed in the buck's hutch, and should be left there for a short time. It would be well for beginners to consult an experienced rabbit breeder on these points, as they are most important.

Three weeks after mating the doe begins to make her nest in the darkest corner of the hutch. Many breeders supply her at this period with a separate nest box; but this is not necessary. A better plan is to shut off the darker part of the hutch (where the door is) by a movable partition. The doe will choose the darkest corner of this part, make her nest of hay and line it with her fur. She should now have an ample supply of sweet hay, green stuff (or roots) and water.

Gestation.—The young rabbits are born thirty days after mating. During the whole period of gestation and while she is nursing her litter, the doe should be kept perfectly quiet and protected from being worried by mice or rats, or frightened by cats or dogs. Towards the end of this period the hutch should be thoroughly cleaned, but without disturbance to the nest.

Three days after the young are born, the hutch should be examined and any dead young which the doe may have carried to a corner of the hutch should be removed.

If it is necessary to handle the litter, the rabbit-keeper should first rub his hands with sawdust from the hutch. Breeding does object to the "human" scent, and will some-

* Addressed c/o The Secretary, The Agricultural Executive Committee.

times abandon a litter for that reason. If the doe is on the litter she may be coaxed away from it with a tasty morsel of food.

Weaning.—The young may be taken from the doe and placed in another hutch in summer, when they are four weeks old, or five weeks in winter.

Winter Breeding.—Where warm hutches and the necessary food are available, breeding may be carried on right through the winter. It is, however, not advisable to mate maiden does after October. During the winter the breeding hutches should have an ample supply of sawdust and straw for litter, and the doe will also require more liberal feeding.

HOUSING.—Any shed, stable or outhouse is suitable for housing rabbits so long as it is dry, light, free from draughts, and well ventilated. Cellars are not suitable.

To economise space, and to give better control, rabbits should be kept in hutches.

A simple but serviceable hutch is illustrated in Fig. 1.

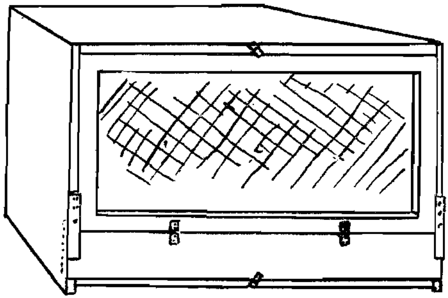

FIG. 1.—A Simple Hutch.

For breeding-does or bucks of the smaller breeds, such as the Dutch Tans and Silvers, the size of the hutch need not exceed 2 ft. 6 in. by 1 ft. 8 in., but a larger hutch should be provided if material and space are available.

The open front is made of strips of wood nailed on 1 in. apart. The door moves on hinges made of leather or strong canvas. For fastening use a staple, a strip of strong leather with a slit and a piece of wood fastened with string to the door.

For the larger breeds the dimensions of the breeding hutch should be 4 ft. 6 in. by 2 ft. by 2 ft.

A hutch of this size is also suitable for the rearing of young rabbits for the table, and will comfortably house six.

A stack hutch (Fig. 2) is recommended where rabbits are to be kept out of doors. It should be made of strong seasoned material and covered with roofing felt. Provision should be made for fixing a canvas screen over the wire netting during unfavourable weather. The stack hutch should be placed in a sheltered position, preferably with a southern aspect. The roof should project about 18 in. beyond the hutches, and space

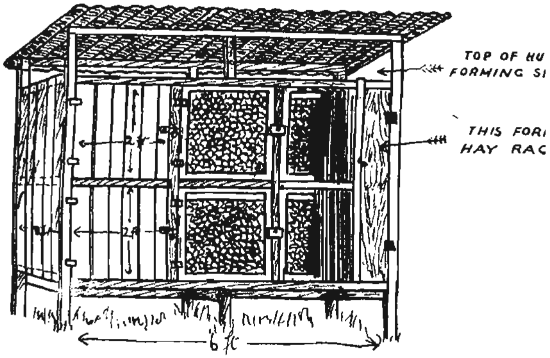

FIG. 2.—A Stack Hutch.

should be provided between the roof of the top hutch and the roof of the stack for storing food and tools.

The floor and 6 in. of the sides of every hutch should be well tarred and sanded to prevent urine from soaking into the wood. The hutches should be thoroughly whitewashed twice a year The breeding hutch should be lime-washed directly the young are weaned, and the fattening hutches when the rabbits are removed.

Open-air hutches are used for keeping rabbits on grass (*e.g.*, lawns). A hutch of this kind is known as the Morant hutch, and consists of a box and a wire netting extension. The box has a door, as shown in Fig. 3, and an opening cut in the side adjoining the wire run to allow the rabbit to pass in and out.

The wire netting cage may have a boarded end, and the netting should be as follows: bottom, 1½-in. mesh; roof and front, ¾-in. mesh.

The front should be 2 ft. high and the back 1 ft. 8 in. high, to produce a sloping roof.

A hutch of this kind accommodates one adult rabbit. It should be moved to a fresh patch every morning and evening, except in wet weather. In the south this system can be adopted successfully from March to October; in the north usually from May to September.

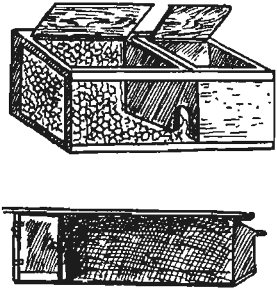

FIG. 3.—Morant Hutch, for keeping rabbits out of doors.

Bedding.—For litter, peat moss, dry earth, sifted ashes, straw or sawdust may be used. Peat moss is not a cheap litter, but makes with the rabbit droppings a valuable manure. Sawdust on the other hand is cheap and very useful as litter, but the hutch cleanings cannot be used as manure until they have thoroughly rotted.

Cleaning.—Hutches should be thoroughly cleaned twice a week and be well littered. The corner, which is as a rule used regularly by the rabbits, should be cleaned every day and be well littered.

Utensils Required.—A short-handled hoe, shovel, hand-brush and two buckets (one for the clean litter and one for the hutch cleanings) are required.

Equipment for the Hutches.—Feeding-trough, drinking-vessel, hayrack. The best troughs are those of glazed earthenware, made with a flange which prevents waste of food.

FOOD FOR RABBITS.—Expert rabbit-breeders, including the most prominent breeders of exhibition rabbits, are agreed that oats, wheat, and millers' offals do not constitute an indispensable part of the diet, either of breeding stock or of young rabbits which are being reared and finished for the table.

A rabbit, like any other animal, needs :—

1. Enough food, and of a sufficient variety, to maintain it in a state of health (maintenance ration), and
2. In addition, as much more food of the right kind as will make it thrive (production ration).

In the days before the War, when corn was cheap, hutch rabbits were often extravagantly fed, with the result that much of the food remained undigested and was wasted.

In the present conditions, when corn is dear and often unobtainable, it is neither desirable nor necessary that cereals of any kind should be used for feeding rabbits. It is therefore necessary to provide rations from other sources, and to use for this purpose foods which are plentiful and might otherwise be wasted.

To supply an efficiency ration it is desirable to use a mixture of foodstuffs in such proportion that the average composition of the food is similar to that of the food of the animals in their natural state. Fortunately, the experience of many successful rabbit-breeders is available for this purpose, for not a few of them, including exhibitors, had already, long before the War, abandoned the idea that the food of rabbits must contain a certain proportion of cereals (oats, wheat, barley, bran, middlings). They proved by the prizes which they took for exhibition rabbits that it is possible to exhibit successfully rabbits fed on green stuffs, roots, and hay, and bred from stock fed on a similar diet.

Summer Food.—*From the Garden and Allotment.*—Pea haulms, celery, chicory, grass (including lawn mowings), leaves of lettuce, cabbage, broccoli, cauliflowers, beet, sugar beet, nasturtium, pea pods, strawberry runners, sunflower leaves, tops of carrots, radishes, turnips, mustard, cress, rape, etc.

Wild Food.—Bindweed, comfrey, chickweed, clover (red and white), coltsfoot, dandelion, groundsel, marshmallow, plantain, shepherd's purse, sow thistle, wild chicory, yarrow, couch and young bracken rhizomes.

Farm Crops.—Clover (red and white), lucerne, maize, sainfoin, tares, vetches, hay, mangolds, turnips, swedes, etc.

Waste from the Kitchen.—Potato peelings (well crisped in the oven, or boiled with chats, and given as mash), apple peelings, waste green stuff.

Other Waste Foods.—Prunings from fruit trees and bushes (apple, pear, nut, blackberry); clippings from hawthorn hedges, elm, oak, lime, poplar, mulberry, willow, broom, furze.

Winter Food.—Beetroot, carrots, kohl rabi, mangolds, parsnips, potatoes (boiled or baked), swedes, turnips, split cabbage stalks, hay, acorns (three per head per day), sunflower seed (half a dozen per head per day during cold weather).

NOTES ON THE FEEDING OF RABBITS.—1. The whole art of rational feeding is to give rabbits as far as possible every day a large variety of food. This is easy enough in the summer, but should also be aimed at in the winter when the choice of food is more limited.

2. Generally speaking, a rabbit thrives on a daily supply of food equal to 2 oz. per pound of its live weight. For a 6-lb. rabbit this would mean :—

10 oz. of green food (or, in winter, roots).
2 „ hay (divided into two meals).

In practice, the rule is to study the appetite of each individual rabbit, and to give each one only as much food (green food, roots and mashes) as it will clear up at a meal. The eating of food, which has been left over from a meal and become stale or contaminated, is often the cause of digestive trouble in rabbits. They should, however, be kept well supplied with hay.

3. Rabbits should never be given stale or frosted food. During frost roots and other food should be kept all night near the kitchen stove so that they are well thawed.

4. Feeding should be at regular hours. Ordinarily it is a satisfactory plan to feed twice a day—in the morning and in the evening. It does not matter greatly which hours are chosen—6 a.m. and 6 p.m., or earlier or later—but once the hours have been fixed they should be kept.

Young rabbits which are being weaned should be fed three or even four times a day.

Breeding does should be fed three times a day, as follows :—

Morning.—Warm mash of boiled small potatoes and peelings mixed with clover hay chaff.
Noon.—Green food (or roots) and hay.
Night.—Green food (or roots) and hay.

5. The rabbits should be kept supplied with fresh water. The water should be changed regularly once a day, and during very hot weather twice a day.

6. Great care should be taken to change the diet in the autumn very gradually from greens to roots, and in the spring back again to greens.

7. Buying rabbit food in small quantities makes rabbit-keeping unnecessarily expensive ; breeders should club together and buy roots, hay, etc., in bulk.

8. When buying stock, rabbit keepers should ascertain the diet on which it has been fed. This knowledge will prevent all the trouble caused by a sudden, and it may be radical change from one dietary to another.

Fattening.—Before putting the young six-weeks-old rabbits into the fattening pen they should be looked over with the object of picking out any well-marked specimens for breeding purposes.

The fattening of the young rabbits begins on the day they are born. The whole art of keeping them growing is to feed the doe on a carefully selected variety of foods (see p. 570).

Where large numbers of rabbits are being reared for the table they should be kept in separate rearing pens according to sex, and also, so far as possible, according to age.

If they have been well bred, fed and treated, they will be ready for killing at 14 or 16 weeks, and yield a dressed carcass of about 3½ lb., the favourite market weight. Larger weights (older rabbits) cost more to produce and fetch less money.

NOTE.—*The Compost Heap.*—Make a wall of turves, enclosing a small space of suitable size in a dry and sheltered part of the garden. Leave an opening in the side to give access to the enclosure.

Spread the solid matter removed from the hutch evenly over the surface of the ground and water the liquids over the layer of solid matter.

The heap takes a few months to make, and the contents should be turned at least once. Wherever possible the heap should be under cover, but where this is not practicable sprinkle dry, sifted earth occasionally over the heap. A valuable manure is thus obtained for the garden or allotment.

Preparing for the Table and the Market.—Full particulars on preparing rabbits for the table and market are given in a leaflet printed by the National Utility Rabbit Association. Copies may be obtained on application to the Food Production Department, 72, Victoria Street, London, S.W. 1.

(This article is also issued as Leaflet No. 265, a revise of which is about to be issued. Copies may be obtained on application.)

ACORNS AS FOOD FOR POULTRY.

HAROLD T. CRANFIELD,
Agricultural Chemist to the Midland Agricultural and Dairy College.

OWING to the increasing shortage of feeding stuffs it has been necessary, during the past few months, to place severe restrictions on the use of corn and meals for feeding poultry. In consequence poultry-keepers are experiencing great difficulty in obtaining sufficient supplies to keep their flocks, and there is not the slightest doubt that the situation will become very acute during the coming autumn and winter.

Poultry foods can, generally speaking, be divided into three classes, viz., corn, meals, and green stuff (vegetables, etc.), all of which are generally considered necessary for the successful rearing and keeping of poultry. Green stuff will not present any difficulty, and meals can still be obtained in limited quantities, although their feeding qualities are in many cases rather poor. Poultry-keepers, however, undoubtedly find supplies of corn exceedingly scarce.

Corn is practically a necessity for stock and laying birds, and it would be next to impossible to attempt to keep poultry for egg production without it. The grains used for poultry are wheat, rye, barley, oats, maize and various foreign seeds. Wheat, barley and rye are prohibited, foreign seeds are practically non-obtainable, and supplies of maize are very difficult to obtain. Consequently, oats constitute the only corn now available, and, since inferior (*i.e.* very husky) grain only can be utilised, this may prove a very inefficient corn ration.

Substitutes for corn have been suggested from many quarters. Sunflower seeds are recommended, but the sunflower requires land and cultivation, while the seeds are too rich in oil to prove a good substitute for corn.

The solution of the problem appears to the author to be found in the utilisation of some existing fruit or seed growing wild in this country, and hitherto of little or no economic importance. He considers that the most promising material is the acorn, and in this article are given the results of a brief investigation into the possibility of replacing the corn ration of poultry by this product of our forests and woods.

Although there have been experiments in the past with a view to utilising acorns as food for cattle (a review of which appeared in this *Journal*, No. 6, Vol. XXI., 1914–15), yet the only suggestion of which the author is aware, that this fruit

could be used as a poultry food, occurs in a paper by Petermann (*Die Landw. Versuchstionen*, LXXXII. I, u. II., p. 93). This author briefly states that he considers acorns dried and ground into meal a good food for poultry.

It is well known that pigeons, pheasants and other wild birds eat acorns with avidity in the autumn, and with apparently no harmful results. Consequently, it does not appear that the feeding of acorns to poultry would be at all risky, and, since their feeding value is considerable, the collection and utilisation of this otherwise waste material would help in no small measure the efforts to maintain the poultry industry in this country.

The following experiment was therefore carried out :—

Acorns from several trees (at least two varieties) were collected last autumn. Owing to unfavourable weather the fruit was rather wet, and a small proportion had begun to sprout. The acorns were spread out in thin layers on sacks in a room, and allowed to remain until surface dry. They were then placed on trays in a cupboard warmed by a hot-water tank, and left there for several weeks. By this time the acorns had become thoroughly dry, the husks being quite brittle and the kernels as hard as maize. The acorns were then kibbled, and the fine meal was sifted out, the husks being completely loosened from the kernels during this operation.

An analysis of the kernels was made, the results being as follows :—

Moisture	13·86
Oil	4·57
Albuminoids	7·88
Soluble carbohydrates	67·82
Fibre	3·63
Ash	2·24
	100·00

These figures agree very well with published analyses of dried acorn kernels. This foodstuff is quite comparable in composition with corn, the feeding value according to the analysis being similar to that of a mixture of oats and maize, the albuminoids only being somewhat less.

Seventeen birds in full lay were selected—twelve pullets and five two-year-old birds. Before commencing the acorn feeding the birds were receiving the following ration per bird per day :—

Soft Food—1 oz. Fish meal.
1 oz. Sharps.
Cooked vegetables.
Hard Food—1½ oz. wheat screenings, oats, and maize.

In the first week of the experiment the corn was reduced to 1 oz. per bird per day, and ½ oz. of kibbled acorns was added (*i.e.*, ½ oz. of the kernels, which constituted about 80 per cent. of the whole dried acorn).

In the second week the remainder of the corn was stopped and 1 oz. of kibbled acorns was substituted. At the beginning of the third week ½ oz. of sharps in the soft food was replaced by ½ oz. acorn meal (sifted out after kibbling), each bird thus receiving 2 oz. of acorn kernels per day.

It is interesting to note that the birds did not attempt to eat the husks.

The birds were watched very carefully for any adverse effects, but none appeared. They picked up the acorns very eagerly from the first, and throughout the experiment appeared to relish them. The acorns had a slightly binding effect, but this counteracted the rather laxative property of the fish meal, and thus rendered the excreta quite normal.

The egg record was as follows :—

—	Two Weeks previous to Experiment.		Acorn Feeding.			
	First.	Second.	½ oz. First Week.	1½ oz. Second Week.	2 oz. Third Week.	2 oz. Fourth Week.
No. of eggs ..	77	78	73	71	73	72
No. of birds in lay	17	17	16*	15†	15†	15†
No. of eggs per bird per week	4·53	4·59	4·56	4·73	4·87	4·80

* One bird broody. † One bird broody and one sitting.

It would appear from this record that the acorns had no adverse influence on the egg production, and, although one cannot draw too hasty conclusions from this brief experiment, yet it is quite certain that if this food had possessed unsuitable properties or a very low feeding value, the egg production would have suffered.

The experiment was discontinued at the end of the fourth week of acorn feeding, the supply of acorns being exhausted.

It is stated in *Fühlings Landwirtschaftliche Zeitung* (1904, p. 808) that acorns fed in too large quantities to hens caused a more or less black discoloration of the egg yolk. Eggs from the experiment recorded above were examined from time to time, but no discolouration was noticed—in fact the eggs were

not distinguishable from those laid before the acorn feeding commenced, both as regards colour and flavour.

It is perhaps a matter of difficulty to give a value to dried acorn kernels at the present time, since at the moment feeding value by no means controls prices. In the author's opinion dried acorn kernels should prove to be at least equal in feeding value to, and certainly much more digestible than, the low grade oats which have been obtainable in limited quantities for poultry feeding during the past winter. These were sold at approximately 45*s.* per qr. (equal to 15*s.* per cwt.). On this basis the dried whole acorns should be worth 12*s.* per cwt. (the kernels constitute approximately 80 per cent. of the whole dried acorns). Fresh acorns contain about 50 per cent. of moisture, which is reduced to 12 to 14 per cent. on drying. The value of fresh acorns should therefore be 7*s.* 6*d.* per cwt. A bushel of acorns weighs about ½ cwt., so that 1*s.* per bush. would not be an excessive amount to pay for gathering. Drying the acorns presents the greatest difficulty. Small quantities could easily be dried in a hot-air cupboard or oven; larger quantities might be dealt with in a malt kiln or hop oast.

The conclusions arrived at may be given as follows:—

1. There is no apparent reason to suppose that acorns after proper drying contain any substance harmful to poultry.

2. Dried acorn kernels can be fed to poultry up to 2 oz. per bird per day without injurious results, provided the remainder of the ration is properly balanced.

3. Acorns possess considerable feeding value, comparable with a mixture of oats and maize.

4. It appears quite possible that grain can be completely replaced by acorns in the feeding of poultry for egg production, provided that the slight deficiency in protein is made up in the remainder of the ration.

THE following Note has been communicated by Dr. Thomas Milburn, Secretary of Agriculture to the Lancashire County Council:—

A War Time Food-Production Effort in Lancashire.

In May, 1917, the Wigan and District Executive Committee drew the attention of the County War Agricultural Executive Committee to several hundred acres of the Wrightington Estate which was lying derelict. The land was subsequently inspected by the Executive Officer and the Board's Commissioner, who reported that about 300 acres had been allowed

to run wild for about twenty years in order to serve as a fox covert; this portion was covered with a thick layer of decayed vegetable matter and with scrub consisting of hawthorns, elders and numerous clumps of rhododendrons. A further 200 acres was reported to be poor grass land which had been mown repeatedly and had had very little manure applied to it. The soil was reported as well drained, deep, and, apart from the odd places where the drains had become choked, admirably suited for arable cultivation.

The agent to the Estate accompanied the Committee's officials over the land and gave all the information in his power, but when informed that the land must be put under cultivation he stated that the owner was not in a position to tackle it. Subsequently Messrs. Sumner and Leivesley, produce merchants, Ormskirk, were introduced to the owner, and within ten days an agreement had been entered into between them and the owner to rent the land for a period of five years.

The 200 acres of poor land, which had been mown regularly and was in consequence not covered with scrub, was ploughed with a three-furrow plough, subsequently disced with the tractor, drilled, harrowed and rolled by horses. It was dressed with $\frac{1}{2}$ cwt. of sulphate of ammonia and $2\frac{1}{2}$ cwt. of superphosphate per statute acre.

As the method of dealing with the rough portion (about 300–400 acres) of land intended for potatoes may differ in some respects from the methods adopted elsewhere with similar land, it appeared to the writer desirable that this method should be placed on record. The trees which were up to 8 and 10 ft. high were either grubbed by hand or pulled out by horses or tractors, and as much of the grass and roughage cut as was possible under the circumstances prior to the commencement of ploughing.

It was found impossible to obtain a set of steam tackle, and recourse was therefore had to the Government Titan tractors. From the outset considerable trouble was caused with the ploughs; the tractors themselves proved fairly satisfactory. The Executive Committee's idea was that the land should be skimmed with a three-furrow plough, but as it was somewhat late for skimming, and as Messrs. Sumner and Leivesley were averse to this method from the first, an effort was made to find a plough which would plough the land deeply and entirely cover the abundant vegetable matter which was on the surface. Many ploughs were tried, the most suitable being the Ransome single-furrow one-way balance plough with disc coulter, while

the Oliver and Grand Detour proved fair seconds. Ploughing with the Ransome single-furrow plough might appear to an outsider as somewhat laborious and costly, but in reality such was not the case, for the following reasons :—

1. A furrow 15 in. wide and 8 to 9 in. deep was taken, and so completely was the rough herbage covered that there was no growth on the surface in the spring.
2. The deep ploughing assisted drainage and the surface was left rough and exposed to the winter's frost. This made the land friable and facilitated operations in the spring.
3. The extra travelling of the tractor, with spuds fixed to the wheels, tended to break up the old sward and eventually flatten such rough grass as had not been cut.
4. A second ploughing operation, which would have been necessary had the land been first skimmed, was avoided—an important consideration in dealing with such a large area.
5. There were numerous groups of large timber and rhododendron clumps scattered about the land from a quarter to half an acre in extent, which it was neither desirable nor practicable to remove, and, as these were irregular in outline, the one-way plough was much more convenient for dealing with the angular and irregular shaped portions.
6. There was no waste of time in setting out ridges or making "finishings."
7. The surface was left even for subsequent operations.

It should be placed on record that a two-furrow balance plough was tried but proved unsuitable, but given a sufficiently strong plough there seems no reason why a two-furrow balance plough should not have done the work quite as effectively as a single-furrow balance plough.

Ploughing was commenced in June and finished in January. In March the tractors started the subsequent cultivation operations, which consisted of the following :—

(*a*) Once disc cultivated.
(*b*) Twice tine cultivated.
(*c*) Once disc cultivated with harrows attached.

No praise is too high for the excellent work done by the disc cultivator.

The land was ridged by horses and the ridges set from south to north in order to allow the sun to penetrate between the haulms when grown. No farmyard manure was applied as it was considered that there was abundant fibre in the land. The following dressing of artificial manures per statute acre was sown broadcast over the drills prior to planting :—

Sulphate of ammonia ...	1½ cwt.	Mixed before application.
Superphosphate	4 ,,	
Flue dust	3 ,,	Applied separately.

The cutting and planting of the sets was done by woman labour.

FIG. 1.—Condition of Land at the Commencement of Operations. Note the Amou of Rough Herbage.

FIG. 2.—Food Production Tractors and Drivers.

FIG. 3.—A Gang of Potato Planters.

FIG. 4.—The Potato Crop, as seen on 10th July, 1918.

It may be mentioned that there were eight tractors engaged on the work, 20 to 24 horses, 20 men and 30 to 35 women. Three to four hundred tons of seed potatoes were required. The oats at the time of writing (15th June) are looking exceptionally well, and the potatoes look promising.*

To have brought this area into cultivation reflects great credit on the District and County Committees, and particularly on Messrs. Sumner and Leivesley. The action of this firm may be looked upon as a patriotic effort of no mean extent, especially as they ordinarily farm about 800 acres in addition to their large merchant business.

Whilst Messrs. Sumner and Leivesley pushed the County Committee at times for more tractors, there was a general absence of petty grumbling about shortage of labour, which seems to support the old saying that " Those who have much to do can do more and do it well." All that is required are the brains, capital, and, what is perhaps most important of all, the will to succeed in spite of the greatest difficulties.

THE following Notes are abstracted from the *Agricultural Organisation Society News and Notes*, June, July, and August, 1918 :—

Successful Co-operative Societies.

The West Midland Farmers' Association, Limited.—This society has a history extending over 16 years. With a turnover of £118,000, and a membership of 792 (101 increase during the year), the committee is able to distribute £2,843 in bonus to members at 8*d*. in the £, to place £300 to special reserve for allowance to employees on Military Service, and to carry forward £1,210.

Biddulph and District Agricultural Society, Limited.—This society has increased its membership by 25 per cent. during the year. Its turnover has exceeded £15,000 ; its share capital has been increased, and the society has also acquired new premises with the object of extending its activities.

The South Devon Agricultural Co-operative Society, Limited.—This co-operative society was registered in May, 1917, but did not begin active business operations until September last. By March 31st, 1918, the membership was 182, and the share capital £853. The turnover for the six months amounted to £7,400. In addition to dealing in feeding stuffs, the society handled 55 tons of seed potatoes, notwithstanding difficulties

* Inspected August 2nd : Oats excellent ; potatoes about half excellent and about half has suffered from drought and other causes:

experienced in obtaining delivery—difficulties by no means peculiar to this society.

The Southern Counties Agricultural Trading Society, Limited.—The eleventh annual report of this society shows a turnover for the year of £540,000, an increase over the previous year of £181,000. Both the Trading Committee and the Auction Committee report an expansion of business, and the realised surplus for the year amounted to £9,681. The Mid-Hants Egg Depot has been taken over.

Ashbourne and District Co-operative Milk Producers' Association, Limited.—The report of this newly-established society only covers three months. The membership is 225. The turnover for the three months was £26,500, while nearly 100,000 gal. of milk were handled at the Mayfield Factory.

Co-operative Mill-Owning.—The Wolverhampton and District Farmers' Association, Limited.—The annual report stated that there was a large increase in the business of this association. The mill which was purchased and taken over during the year had been a success, and is a real asset to the business. The net sales during 1917 amounted to £20,770, against £7,874 in 1916, whilst the membership numbered 162 at the end of 1917, as compared with 108 in 1916. The membership has since gone up to 197, and new members are continually being enrolled. The Dairy and Cheese Department is making good progress, and a considerable quantity of milk is being dealt with.

The Pershore Co-operative Fruit Market.—The sales for last year amounted to £81,857, being an increase of £35,903 over the previous year, while the profit realised was £3,042. The committee were enabled to recommend a bonus of £3 15s. per cent. to shareholding growers in proportion to the value of their produce marketed.

The Hayling Island Farmers' Co-operative Society.—This is a co-operative implement society, owning its own machinery, steam ploughs and cultivators. Of the thirteen farmers in the island eleven are members. The whole of the threshing is done by the society's tackle, and the committee is now contemplating the purchase of a tractor. The Secretary states that so far as getting the work done is concerned, the society's machinery has given great satisfaction, and no members would think of reverting to the old order.

The West Glamorgan Farmers' Association, Limited, reports a turnover for the last year of £9,077, an increase of over £3,000 on the preceding year, while the membership has risen from 112 to 158. Notwithstanding the difficulties of trading, the

profit for the past year was upwards of £200, and the association has accumulated a reserve fund of £366, mainly invested in War Loan, while members individually have bought War Savings Certificates to the amount of £3,232.

The Mid-Cheshire Farmers' Co-operative Society, Limited, shows a turnover of £62,840, with a realised surplus of £831. During the year the committee purchased a shop and mill at Chelford for use as a store, and they are well satisfied with this extension of the society's work.

Bishop Auckland Farmers' Association, Limited, reports a large increase in business during the year, the turnover being £20,120 as compared with £12,726 for the previous year. The profit for last year amounts to £435, and the report states that the purchasing of members produce for re-sale is increasing rapidly.

Newport (Salop) and District Agricultural Co-operative Trading Society, Limited, has a membership of 453, a slight increase on the year. It has sold the produce of its members to the extent of 10,524 bags of barley and 8,477 bags of wheat and oats, and a very good business has also been done in clover, grass and root seeds. The turnover for the year was £101,601 ; a record for the society.

Parasitic Mange: Important to Horse Owners.

(1) **Obligations under Order and Penalties.**—Under the Parasitic Mange Order, 1911, every person in Great Britain having in his possession or under his charge a horse, ass, or mule affected with or suspected of parasitic mange is required to give notice of the fact with all practicable speed to the Police. Failure to give such notice renders a person liable to a fine of £20, and, in certain circumstances, to a month's imprisonment.

(2) **Prevalence of Disease.**—The information obtained by the Board from inquiries made in connection with the many outbreaks of mange reported to local authorities shows that the disease is very prevalent at present, and, though the disease is not of a nature which need alarm horse owners, it is highly desirable that every possible means should be taken to prevent animals becoming affected with parasitic diseases, and to cure them promptly if found affected

(3) **Importance of Notification.**—One of the objects of requiring notification is to ensure that the affected animal shall be treated so as to be cured as quickly as possible. *The Order of* 1911 *as amended by the Order of* 1918 *permits of an affected*

animal being worked subject to certain conditions. An owner may also employ his own veterinary surgeon to advise him regarding treatment.

(4) **How Farmers Benefit Themselves by Observance of Order.**—It rests mainly with an owner to keep his horses fit and free from such parasitic diseases as mange and lousiness. By so doing he benefits himself, for the small extra trouble involved will pay him, since his animals will improve in condition, will be fit for more work, and will require less food than when their bodies are called upon to supply food for thousands of parasites in addition to their own needs. In treating the skin for one kind of parasite, others can be got rid of. - It is not a very difficult matter to keep a horse free from parasites.

(5) **When in Doubt Notify Police.**—A farmer in his own interests will do well in all cases of doubt to obtain advice by notifying the Police. *He will then be informed whether the animal has mange or not, what form of mange, if any, it is suffering from, and how to treat it and prevent it from spreading to his other horses and those with which the affected animal may come in contact.*

(6) **Horse Owners Should be Suspicious when Symptoms Appear.**—At present it is as well to regard as suspicious every horse which shows signs of itchiness by rubbing, and particularly when the rubbing has caused areas where the hair is thin and broken.

Now is the time to get to work, as washing or spraying is a simpler matter in warmer seasons. Mange and lousiness can now be got rid of if owners give the matter a little attention.

(7) Horses belonging to the Food Production Department are under special rules for the cure and prevention of mange.

RULES TO BE FOLLOWED FOR THE PREVENTION AND CURE OF MANGE IN HORSES.

(1) To aid in the prevention of mange, all horses should have their manes hogged and the long hair clipped from the feet and coronets.

(2) As far as possible each horse should habitually occupy the same stall, and the harness of one horse should not be used on another unless it has been previously wiped over with anti-mange dressing, or otherwise disinfected.

(3) Before another horse is put into a stall which has been occupied by an affected or suspected horse, the wood-work, head-rope or head-stall, and the floor should be washed over or sprayed with anti-mange dressing.

(4) The harness, stable tools, and cart shafts used in connection with an affected or suspected animal should be well dressed with, or soaked in, the dressing, or they should, the case suiting, be placed in a small room and submitted for several hours to strong sulphur fumes. This should be carried out at least once every seven days, until the disease or suspicion has been removed.

(5) When a case of mange is found to exist on premises, all the horses, their harness, etc., for purposes of prevention should be regarded with suspicion, the harness, stable tools, etc., being treated once a week as in (4). The skins of all horses, even though the animals show no outward symptoms of mange, should be sponged over or sprayed once a week (say, Saturday evenings) with anti-mange dressing, and particular attention should be paid to the coronets, the tail, and the mane. These should be well soaked with the dressing by means of a water brush or spray pump. Particular attention should always be paid to parts which appear to be rubbed. If the dressing be made up with warm water the horses will take more kindly to the spraying. After sponging or spraying of the skin the horse should be left alone for ten minutes, and then the skin should be wisped over to help drying.

(6) If it be found after inquiry that the disease is sarcoptic mange an owner should get his veterinary surgeon to see the animal from time to time, and advise as regards treatment and progress. If it be found that the disease is psoroptic mange, an owner can quite well, after receiving the official instructions, apply the treatment to the animal himself; but it must be remembered that it is no use treating merely the parts visibly affected; the whole skin should be sponged or sprayed with the dressing prescribed.

(7) The litter from an affected horse should be well moistened before removal. It should afterwards be placed on a manure heap well removed from contact with horses.

(8) All new purchases or borrowed horses should be dressed or sprayed as in (5) at least three times.

(9) For the prevention of external parasitism, which is prevalent in these times, and the infection of which may be picked up in innumerable ways, it would be well for owners of working horses, even when they appear free from parasites, to make a practice of spraying the

whole bodies of their animals once a week, say, on Saturdays, with a suitable anti-parasitic dressing. Suitable spraying machines and dressings can be obtained through agricultural implement dealers and chemists, but before placing their orders owners should apply for advice to the Local War Agricultural Committee, who are in a position to recommend the most suitable spraying apparatus and dressings.

NOTE.—Fuller and more detailed information regarding mange as a disease will be found in the Board's Leaflet No. 274. This can be obtained free of charge by applying to the Board of Agriculture and Fisheries, 3, St. James's Square, S.W. 1.

(NOTE.—*This article is also issued as Leaflet No. 8 of the Joint Committee of the Board of Agriculture and Fisheries and the Ministry of Food.*)

THE Board have received the following communication from Dr. Thos. Milburn, the Secretary of Agriculture to the Lancashire County Council :—

The "Crop" of a Wood Pigeon.

Many examples of the damage done to newly-sown corn crops and to young clover plants have, from time to time, appeared in the Press ; the following will serve as a useful record of the voracious feeding of the wood pigeon, and will also show its preference for a vegetable diet, particularly grain and cultivated plants.

The pigeon was shot by Windham E. Hale, Esq., Chairman of the Lancashire Agricultural Sub-Committee and of the War Agricultural Committee ; the corn and other seeds were counted and have been preserved as a permanent record at the Agricultural Department, County Offices, Preston. The following is a list of the contents of the crop (see Fig.) :—

Barley grains	561
Clover leaves	113
Rye grass seeds	986
Clover seeds	108
Weed flowers	—

It was difficult to give a correct record of the weed flowers, as they were in various stages of development. There would, however, probably be about 60 to 80.

It will be noticed that grain preponderates both in bulk and weight, and as this grain had been picked up in an adjoining field which had been sown with barley, some idea of the loss sustained may be gauged when it is remembered that each grain should have produced its "hundredfold."

There were 113 clover leaves, each consisting of three leaflets, hence illustrating the considerable damage which must be done to young clover plants by wood pigeons.

The number of rye-grass seeds is very large and at least 80 per cent. of them would, if left, have produced living plants. The loss in crop must be considerable where large numbers of birds are concerned.

More clover seed might have been expected, but even 108 grains is a fairly large number for a single bird.

The weed flowers were exceedingly difficult to record as they were in various stages of development. They consist chiefly of charlock, and

as each flower head would, under normal conditions, have produced a large number of seeds it may be fairly said that these serve as a slight set-off to the damage otherwise done. Nevertheless there is overwhelming evidence that the evil is much greater than the good.

This is but the record of a single pigeon, and as hundreds of pigeons may be seen in a clover or grain field at once we can imagine what the sum total of damage may be. It is undoubtedly of such a nature that it is incumbent on farmers and others to reduce drastically the number of birds by every practical and lawful means available.

It should be recorded that there were no insects present in the crop of this pigeon, in fact no other contents besides those above recorded, except two pieces of grit.

Roadside Grazing.

DURING the present summer a good deal of rough hay has been cut from the roadsides with a view to its use for stacking or the immediate feeding of small stock. In some parts of the country also there has been a certain amount of roadside grazing, and it seems probable that this might be made much more general to the benefit of small holders and other persons of moderate means without serious danger to the public.

The attention of the Board of Agriculture has been called to the fact that in certain cases the police have intervened to prevent persons grazing their animals by the roadside in rural districts where there is plenty of grass not otherwise utilised and where there is no substantial risk of obstruction to users of the roadway. In doing this the police are no doubt entirely right from a legal point of view; but as the President of the Board of Agriculture has pointed out, and the Food Production Department now emphasises, in times like these a certain degree of latitude may well be allowed. As a rule the right of grazing on the roadside waste, unless it is part of the waste of the manor, and consequently "common," is vested in the owner of the adjoining fields; and if he chooses to do so he is entitled to prevent any use of it by others. But the action of the police above referred to does not appear to have had any connection with the protection of these interests; it seems to have been taken by way of enforcing the provisions of the Highway Acts, which impose penalties for the straying of animals on the highway or grazing on the roadsides, whether tethered or not. Mr. Prothero is of opinion that it is more important to-day that every bit of available food for animals should be profitably used than that the rights of ownership on the roadside should be rigorously enforced or the highway provisions literally interpreted. Of course, the assumption is that persons grazing their animals on the roadside will take care that no injury is done to the hedges, nor any obstruction caused.

The Home Office, it may be added, is in thorough agreement with the views of the Board of Agriculture on this subject, and a circular has been sent out to all chief constables of counties in England and Wales to this effect.

School Gardens in Oxfordshire.

THE Report on the Elementary School Gardens of the Oxfordshire Education Committee for the year 1917, gives some very interesting figures of the work of school children in the cultivation of school gardens. The results speak highly of the efforts of our boys and girls in assisting in the great object of food production. Other Education Committees would do well to endeavour to emulate these excellent results.

The Report states that owing to changes in staff and other reasons it has not been possible to present as complete a return as it is hoped to do another year.

The total area under cultivation as School Gardens from which complete returns have been received was 6 acres in 60 places.

The vegetables produced from these gardens valued at Government market prices (as far as fixed), or at local market prices, were worth about £600. Thus every pole produced food to the value of 12*s.* 6*d.*, and every acre to the value of £100.

Yields of the Green Crops.

Number of Reports Received.	Kind of Vegetable.	Variety.	Quantity of Seed Supplied to each School Garden.	Average Yield of Crop per School Garden.	School Garden with Highest Yield.		Total Yield of Crop from all the School Gardens.		
				lb.		lb.	tons.	cwt.	lb.
81	Potato ..	Eclipse (Scotch seed) ..	3½ lb.	110	Sibford Gower ..	265	3	19	62
81	,, ...	,, (Lincolnshire seed)	3½ ,,	101¼	,, ..	198	3	13	25
30	,, ...	,, (Home-grown seed)	3½ ,,	86	Milton-under-Wychwood	209	1	3	4
75	,, ...	Reliance (Scotch seed) ..	3½ ,,	103	Sibford Gower ..	225	3	8	109
63	Peas	Pioneer	½ pint	38	Crowmarsh	116	1	1	42
66	,, ...	Hundredfold	½ ,,	44	Headington Quarry	200	1	5	104
72	Broad beans ..	Prolific Longpod ..	½ ,,	53	Mapledurham ..	143	1	14	8
61	Runner beans..	Scarlet	½ ,,	105	Henley Trinity ..	336	2	17	21
70	Beet	The Globe	½ oz.	95	Stanton St. John ..	386	2	19	42
69	Carrots ..	New Red Intermediate	½ ,,	140	Adderbury	360	4	6	28
66	,, ..	Favourite	½ ,,	135	Steeple Aston ..	336	3	19	62
73	Onion	Improved Reading ..	½ ,,	86	Thame British ..	300	2	16	6
74	,, ...	Selected Brown Globe ..	½ ,,	75	Ewelme	220	2	9	62
53	Parsnip ..	Tender and True ..	½ ,,	123	Thame British ..	448	2	18	23
56	*Turnip* ..	Snowball	½ ,,	96	Steeple Barton ..	336	2	8	0
58	Lettuce (cabbage)	Ideal	½ ,,	(No.) 145	Highmore ..	(No.) 500	(No.) 8410		
46	Brussels sprouts	Exhibition	¼ ,,	,, 101	Thame British	,, 300	,, 4646		
54	Cabbage ..	All Heart	¼ ,,	,, 97	Henley Trinity	,, 500	,, 5238		
52	Cauliflower	Autumn Mammoth ..	¼ ,,	,, 53	Middleton Stoney	,, 200	,, 2756		
56	Savoy	Best of All	¼ ,,	,, 64	Watlington C.	,, 250	,, 3584		
48	Kale	Extra Curled Scotch ..	¼ ,,	,, 58	,,	,, 200	,, 2784		
45	Broccoli ..	Purple Sprouting ..	¼ ,,	,, 66	,,	,, 150	,, 2970		
45	,, ..	White ,, ..	¼ ,,	,, 52	Garsington ..	,, 170	,, 2340		
43	Leeks	Improved Musselburgh	¼ ,,	,, 134	Thame British	,, 680	,, 5762		
67	Veg. marrows..	Long Green	18 seeds	,, 35	Toot Baldon..	,, 120	,, 2345		
			18 seeds	,, 35	Henley Trinity	,, 120			

P.S.—The average area of each School Garden was 16 poles.

The seed potatoes supplied weighed 934½ lb., and produced a yield of 12 tons 4 cwt. 88 lb., on an area of approximately 89 poles. This gives an average yield per acre of 22 tons, and shows the great gain in yield resulting from spade cultivation. Peas yielded 2 tons 7 cwt. 34 lb. from 64½ pints of seed, onions 5 tons 5 cwt. 68 lb. from 73½ oz. of seed, carrots 8 tons 5 cwt. 90 lb. from 67½ oz. of seed, parsnip 2 tons 18 cwt. 23 lb. from 26½ oz. of seed, and turnips 2 tons 8 cwt. from 28 oz. of seed.

In addition to the above acreage the children have cultivated over 3 acres of waste land, and very large numbers of allotments and gardens belonging to widows and soldiers, voluntarily and without pay.

The yields of the green crops are given in the table on page 587.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester; and 1, St. Andrew's Crescent, Cardiff.*

THE following Letters have been issued by the Food Production Department of the Board :—

Collection of Blackberries.

Letter (No. C.L. 37/4), dated 17th July, 1918, addressed to Horticultural Sub-Committees :—

SIR,—Owing to the partial failure of the fruit crops it is urgently necessary, in the national interests, to make provision for the systematic collection of blackberries and for the dispatch of the collected produce to jam factories controlled by the Ministry of Food.

Inasmuch as the responsibility for providing supplies of jam for the Navy, Army and civilian use rests with the Ministry of Food, it has been proposed by the Ministry that the responsibility for the distribution of the produce collected shall be entrusted to the Divisional Food Commissioner. Both this Department and the Ministry of Food are, however, desirous of securing the active assistance of the County Horticultural Sub-Committees in the organisation of collection in the counties and also of utilising the services of county marketing organisations for the purpose of dispatch of the produce collected.

In order that supplies of blackberries adequate to meet the very considerable needs of the situation may be collected it will be necessary to secure the active and full co-operation of all county organisations, as for example, the Women's War Agricultural Committees, Part-time Committees of National Service, Boy Scouts and Girl Scouts and Girl Guide Associations. In particular the help of the Local Education Authority, which proved invaluable last year, will be essential to success, and the Departments are approaching the Board of Education with the object of securing their approval of the suggestion that school teachers and school children should be asked through the Local Education Authority to lend their assistance.

In the event of your Committee being prepared to take a leading part in this work, I would suggest that you should communicate forthwith with the Divisional Food Commissioner with the object of holding a conference with him and others interested and, if necessary, appointing a special committee to work out details of organisation.

I am further to suggest that it would be desirable, if the work is undertaken by the County Horticultural Sub-Committee, that the Committee should appoint, for the purpose of this work, the Divisional Food Commissioner or the Officer to whom he delegates the work of blackberry organisation as a temporary member of the Committee.

Miss Day, the officer in charge of organising the collection of natural produce on behalf of this Department, will be pleased either to attend a meeting of your Committee, or, failing that, to send a detailed memorandum containing suggestions for the organisation of the collection in the counties.

I am, etc.,
(Signed) G. F. MIDDLETON,
For Controller of Horticulture.

Letter (No. C.L 40/H), dated 31st July, 1918, addressed to Agricultural Executive Committees :—

SIR,—I am directed to inform you that the Food Production Department, at the request of the Ministry of Food, are asking the Horticultural Sub-Committees in various counties to organise the collection of blackberries throughout the country, as this fruit is urgently required by the Ministry of Food for the purpose of being made into jam to satisfy the needs of the Army and Navy. The Department have circularised the various Horticultural Sub-Committees with regard to the collection, and they have been asked to approach the Agricultural Executive Committees with a view to the latter asking farmers—

1. To allow reasonable access to the hedges surrounding their fields to any gangs of pickers who may be organised for the purpose ; and
2. To refrain from clipping their hedges before the blackberries are gathered.

The Department will be glad if Executive Committees will assist the Horticultural Sub-Committees in this way so as to ensure that the maximum amount of blackberries in the county may be picked.

I am, etc.,
(Signed) G. F. MIDDLETON,
For Controller, Horticultural Division.

THE following Memorandum (No. C.L. 69/C. 1), dated 30th July, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Growing of Strawberries.

On 27th November, 1917, the Department issued a Memorandum (Ref. No. 7/C. 1)* to Agricultural Executive Committees suggesting that while it was not desirable to reduce the area under strawberries, Committees might take steps to restrict any increase, but the inquiries of the Department show that there has in fact been a considerable

* Printed in this *Journal*, December, 1917, p. 1012.

decrease in the strawberry acreage. Whereas the area devoted to this crop in England and Wales on holdings over one acre was 23,374 acres in 1914, there has been a progressive decline in each subsequent year, and it is estimated that the area at present does not exceed 10,000 acres.

The supplies from the present acreage are quite insufficient to meet the demand for jam both for the Navy and Army and for the civilian population, or to provide any surplus of fresh fruit. Moreover, as a result of the discontinuance of fresh planting during the War the majority of the remaining beds are old and worn out and will be grubbed as unprofitable at the present controlled prices. It is essential, therefore, that a considerable new area should be planted next autumn and spring, and the Department have decided accordingly to withdraw their Memorandum of 27th November, 1917, and to encourage replanting so as to secure an increase in the present area up to the acreage in 1914.

Agricultural Executive Committees should, therefore, let it be known that no objection will be taken to new plantations, but they may stipulate that they should be intercropped with a food crop during the first year after planting.

Inquiry as to the Results Obtained on Land Broken out of Old Grass or Leys of Five Years or Over for the 1918 Crop.

THE Food Production Department are anxious to secure, as soon as possible, information as to the results of breaking up grass land for this season's crop, and have asked Agricultural Executive Committees to obtain, during the interval between now and the end of the corn harvest, particulars regarding the crops growing on new arable land in their respective counties.

It has been requested of the Committees that a certain number of parishes in the county should be selected, and every field broken up for this year's crop in these parishes should be carefully inspected and an estimate made of the crop. The number of parishes will naturally vary in the different counties, but it should be approximately equivalent to one parish for every 5,000 acres of land broken up, and in no case should the number of parishes be less than three for an administrative county. The parishes are to be carefully selected, so that the average return from them may be regarded as fairly representative of the county as a whole. Where one of the officers of the Committee can be spared for the work and is accustomed to value growing crops, or crops in the stock, it is suggested that the most satisfactory plan would be to have all or most of the selected parishes surveyed by him in consultation with local farmers or surveyors, but in other cases district Sub-Committees might be asked to undertake the work themselves. They will have inspected most of the fields concerned, and will have had them under observation during the past year. Fields broken up in 1917 and summer fallowed last year are to be included in the return.

The estimated yield of each field inspected is to be recorded, and the returns, when completed, forwarded immediately to the Food Production Department, who will tabulate the results. It is intended that this estimate shall be checked during the winter by securing as far as is practicable the thrashing returns from the same parishes.

THE *following* Memorandum (*No.* 241/1 *M.* 12), dated 2nd August, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

Organisation of Threshing.

In order in some measure to overcome the great shortage of engine drivers the Department suggest that Agricultural Executive Committees should approach corporations, district rural councils and other similar bodies with a view to arranging for the loan to threshing contractors of skilled engine drivers in the employment of local authorities. This proposal has been favourably considered by local authorities in certain counties, who have already been approached in the matter, and it is considered that every effort should be made to come to similar arrangements in each county.

THE following Notice (No. C.L. 225 (*a*)/M. 2), was issued in July by the Food Production Department of the Board :—

Coal for Steam Cultivation and Threshing Purposes.

Farmers who require coal for steam cultivation or threshing purposes should, in the first instance, apply for Priority Orders to the Food Production Department, either direct or through their usual coal merchants. If the coal merchants are unable to meet their requirements, they should communicate with the District Coal and Coke Supplies Committee covering the collieries from which their supplies have hitherto been obtained, who will in turn take the matter up with the collieries concerned. The District Coal and Coke Supplies Committees have been advised by the Controller of Coal Mines to this effect.

The Food Production Department only issue Priority Orders for coal for steam cultivation up to 25 tons at one time, and for threshing purposes up to 10 tons at one time When farmers have only a few days' threshing it is advisable that they should arrange to share a truck.

It is essential that the instructions printed on the back of the Priority Orders are strictly carried out, and that the number of acres to be cultivated or of days' threshing to be done, is stated on the form. When a contractor is employed his certificate must also be given.

THE following Notice was issued early in August by the Food Production Department of the Board :—

More Soldier Labour for Harvest: Important Notice to Farmers.

The Army Council has decided to release several thousand soldiers on agricultural furlough for harvest work. These men will be distributed among the counties where labour assistance for the harvest is most needed. Farmers requiring additional labour to gather the harvest should apply at once to their County Agricultural Executive Committee.

THE following Memorandum, dated 17th July, 1918, has been issued to Agricultural Executive Committees by the Food Production Department of the Board :—

Prisoners of War. 1. Until further notice it will not be possible for the Department to get prisoners of war voted by the Prisoners of War Employment Committee for new agricultural schemes, or additional prisoners for the existing prisoners-of-war camps. All prisoners of war who may be available will be allotted to schemes already in hand, or utilised in migratory gangs for harvest work. Further applications for permanent prisoner depots should, therefore, not be submitted to the Department for the present.

2. The attention of Agricultural Executive Committees is called to the fact that women of the Women's Land Army should not work on the same farm as prisoners of war. Committees should be careful to keep the Women's Committee informed of the farms to which prisoners are sent, in order that they may make their arrangements accordingly. Committees should not sanction applications for prisoner labour if women of the Land Army are being employed by the applicants.

3. *Harvest Wages.*—With reference to the scheme F.P. 295/L.2,* as to the employment of prisoners on harvest work, the War Office have not been able to agree to the mid-day meal being provided by the farmer, and they have informed all Commands accordingly. Rations to include the mid-day meal will, therefore, be supplied by the Military Authorities, and the Department have requested that the ordinary scale of rations laid down for prisoners should be increased for men employed for long hours daily on harvest work.

The following charges should be made for all prisoners when employed on corn or potato harvest work :—

> 7*s.* for a day of 10 hours, excluding meal-times, in the counties of Cambridge, Essex, Hunts, Isle of Ely, Lincolnshire, Norfolk, Soke of Peterborough, Suffolk, the East and West Ridings of Yorkshire, and Rutland, and 6*s.* for a day of 10 hours in the remaining counties of England and Wales. Overtime should be charged for at the rate of 8*d.* per hour.

4. The attention of the Department has been called to the fact that at some of the prisoner depots soldiers of Agricultural Companies have been attached for the purpose of taking out the prisoners, but do no work. Committees are apparently paying such men the ordinary rate of agricultural wages, but receiving no payment from the farmer in respect of their services. Committees should note that this is unauthorised, as all gang leaders must work and be paid for by the farmer Soldiers who refuse to work or are incapable of doing so should be returned to the Distribution Centre, and other men sent in their places.

THE following Notice was issued towards the end of July by the Food Production Department of the Board :—

Badly-Laid Grain: How to Harvest It. The Food Production Department draw attention to a useful device for the harvesting of badly-laid grain crops. The method is commonly practiced in some districts, and consists of attaching a certain nnmber of grain-saving guards or lifters

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* Printed in this *Journal*, July, 1918, p. 469.

to the fingers of the knife board. These guards are simply enlarged fingers with self-adjusting points and, as a rule, four are required for a 5-ft. binder and five for a 6-ft. machine. Their cost is inconsiderable; and in careful hands they prove of material assistance in the cutting of a laid crop. They are best adapted for ground that is not too soft. Local implement agents will, no doubt, be able to supply grain-saving guards.

THE following Notice was issued by the Food Production Department of the Board towards the end of July:—

Crimson Clover and Lucerne as Useful Autumn-sown Fodder Crops.

The attention of farmers is directed to the importance of making adequate and timely provision for a supply of cattle fodder for next year.

Owing to the prolonged drought it is feared that in some cases young "seeds" have failed. On warm, loamy or medium soils in the southern and south-eastern counties failure, whether partial or complete, may be remedied by harrowing in seed of crimson clover (*Trifolium*) immediately after harvest at the rate of 15 to 20 lb. per acre, according to the degree of failure and the condition of the tilth. Crimson clover may also be sown on stubble land. The land should be heavily harrowed, not ploughed, the seed sown on the scarified surface, covered with lighter seed harrows and firmly rolled in. Normally the crop is ready for cutting or feeding off in the following May or June, or it may be cut for hay directly the flower-heads appear, or left until in full flower and made into silage. After the removal of the crop a half-fallow may be made, or in suitable circumstances a green crop taken. For ensilage, crimson clover might be tried as a substitute for vetches, which at present are both scarce and dear.

Lucerne is another useful crop suitable for early autumn sowing in certain districts. Though sown as a rule in spring, generally along with a nurse crop, there is sufficient evidence to show that on clean, well-drained land in the south of England, or milder localities further north, it will do equally well when sown alone before the end of August. In such circumstances it is generally taken after a bare or half fallow or after early potatoes. At least two cuts should be obtainable in the following year and up to four cuts each year subsequently. It may be fed green or used for hay or silage. Lucerne is specially valuable: (1) for supplementing bare pastures in dry seasons; (2) as a means of economising oil-cake and supplementing roots in the winter feeding of cattle; (3) on account of its power of enriching the soil for the benefit of subsequent corn crops.

For further particulars as to the cultivation and uses of these crops readers are referred to Leaflets No. 160 (*Lucerne*) and No. 182 (*Crimson Clover*), copies of which may be obtained free and post free on application to 3, St. James's Square, S.W. 1.

THE following Memorandum (No. C. L. 67/C.1), dated 23rd July, 1918, was issued to Agricultural Executive Committees by the Food Production Department of the Board :—

Crops Damaged by Insect Pests.

In their Memorandum of the 24th May last (C. L. 56/C.1)* the Department authorised Agricultural Executive Committees to supply seed for resowing free of charge in cases where occupiers, who had ploughed up grass land by direction of the Committee, had suffered substantial loss from insect pests in spite of having taken all reasonable and proper precautions in the cultivation of the land.

When that Memorandum was issued it was uncertain whether the Defence of the Realm (Losses) Commission would admit claims for compensation in cases of loss from insect pests, and the offer to supply seed for resowing free of charge was, therefore, made in the interests of food production so as to secure some production from the land on which the first crop had failed.

The recent decision of the Defence of the Realm (Losses) Commission which was communicated to Committees in the Department's Memorandum of 12th July (C. L. 64/C.1)† has altered the position, and the authority to supply seed free of charge is therefore withdrawn.

No further payments should be made under that authority, and Committees should supply the Department before the end of this month with a statement giving particulars of all cases in which Committees have made use of the authority. The name and address of the occupier, the cause of the damage to the first crop, the area affected and the cost and kind of the seed supplied or paid for should be given, and the statement should be accompanied by a certificate that in each case the Committee satisfied themselves that the loss had not been due to any negligence on the part of the occupier.

AN Order (No. 631), dated 7th June, 1918, was made by the Board of Trade to the effect that :—

The Hay and Straw Order, 1918.

1. No person shall, without the permission in writing of the Controller of Horse Transport, feed any horse or permit any horse to be fed with hay, straw or chaff made from hay or straw, except as provided in this Order.

2. This Order shall not apply to horses falling within the Classes mentioned in the First Schedule.

3. Horses falling within the Classes mentioned in the Second Schedule may not on any day be fed with more than the quantity of hay, straw or chaff made from hay or straw prescribed for such horses.

4. Any person in possession of a horse or horses falling within the Second Schedule shall keep a record in writing showing (1) the number and class of horses kept by him ; (2) the total maximum daily ration authorised by this Order ; (3) the description and quantity of hay, straw and chaff fed to such horses each week ; (4) the description and quantity of all hay and straw purchased by him and the date of such purchase. Such records shall at all reasonable times be open to the inspection of an Officer of Police or any person authorised by the Controller of Horse Transport.

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* Printed in this *Journal*, July, 1918, p. 475.

† Not here printed.

5. No straw shall be used for the purpose of bedding horses.

6. In this Order "Horse" includes a mare, gelding, colt, filly, pony, mule and ass; "Hay" includes clover.

7. This Order shall come into effect on 17th June, 1918.

FIRST SCHEDULE.

Horses excluded from the operation of this Order:—

(a) Horses in the possession of the Army Council, the Admiralty, or the Air Board, or exclusively used for the purposes of the Army Council, the Admiralty, or the Air Board.
(b) Horses maintained and used exclusively for agricultural purposes.
(c) Stallions used exclusively for Stud purposes, brood mares, weaned foals and yearlings.

SECOND SCHEDULE.

Class of Horse.	Maximum Daily Ration of Hay and Straw Chaff.
(a) Heavy Dray and Cart Horses and Trotting Vanners	16 lb.
(b) Light Draught Horses and Light Trotting Vanners	14 "
(c) Other Light Horses and Cobs	9 "
(d) Ponies 14 hands and under	7 "
(e) Racehorses registered with the Controller of Horse Transport for the purposes of the limited racing scheme	8 "

Note.—Correspondence with respect to this Order should be addressed to the Controller of Horse Transport, 7, Whitehall Gardens, S.W. 1.

THE following Memorandum (No. C.L. 230/M.4), dated 22nd July, 1918, has been addressed to Agricultural Executive Committees by the Food Production Department of the Board:—

Supply of Forage. The Department have had under consideration the existing scheme for the supply of forage by the Army Service Corps for horses under the direct control of Agricultural Executive Committees as set out in Circular Letter 12 L.2* of the 24th December, 1917. The War Office have now agreed to the revised scheme of which details are given below.

Allotment Committees have been set up in the various counties for the purpose of disposing of all hay which is surplus to the requirements of the Military Authorities and the producer. The Agricultural Executive Committee must inform the Allotment Committee for their county of the total quantity of hay which will be required during the next twelve months on the basis of two tons of hay for each horse at present under their direct control. Horses on hire to farmers for one month or longer under Scheme "A" of F.P.92 will therefore be excluded from the arrangement. The Allotment Committee should be informed also of the amount of hay which it is desired to be purchased in each locality so that railway and road transport may be reduced to a minimum. The hay will be bought in the stack and the Agricultural Executive Committee must arrange for it to be cut and drawn, as required, by their own men and horses. The price of the hay will be the net cost price, and Agricultural Executive Committees will make payment direct

* Printed in this *Journal*, January, 1918, p. 1160.

to the Forage Committee. In the event of the number of horses under the direct control of the Agricultural Executive Committee being increased beyond present strength, it will be necessary to obtain hay for them under the existing arrangement, by which Agricultural Executive Committees indent on the Headquarters of the Command in which their county is situated.

The Department require to be informed at the earliest possible date of the total qnantity of hay which each Agricultural Executive Committee has reqnisitioned from the Allotment Committee under the new scheme.

The Department have under consideration the possibility of similar arrangements with regard to the supply of oats and oat-straw, with regard to which a further Memorandum will shortly be issued.

Preservation of Farmyard Manure.

THE following Circular letter (No. C.L. 5/T.), and the accompanying Memorandum (No. C. L. 5 (*a*) T.), dated 3rd August, 1918, have been addressed to Agricultural Executive Committees by the Food Production Department of the Board :—

SIR,—In view of the shortage of artificial fertilisers, and the increased need for manure because of the extension of the tillage area, it is especially important at the present time that farmyard manure should be carefully preserved.

I am to suggest, therefore, that in any action which may be taken by your Committee in the direction of improving methods of farming, special attention should be given to securing reasonable care of farmyard manure, including liquid manure.

I am to enclose for your information a Memorandum on the Preservation of Farmyard Manure which indicates the most important points to which attention should be given.

I am, etc.,
(Signed) H. L. FRENCH,
General Secretary.

ENCLOSURE.

Before the War, farmers in the United Kingdom are estimated to have used about 27,000,000 tons of farmyard manure, containing about 185,000 tons of nitrogen ; they used some 80,000 tons of nitrate of soda and 60,000 tons of sulphate of ammonia, containing together about 25,000 tons of nitrogen. There is a great loss of nitrogen from farmyard manure as at present managed, which competent authorities put as high as 50 per cent. in some cases. If the making and storing of the manure could be so improved as to add only 5 per cent to the nitrogen usually present when the dung is applied to the land, this saving would be equivalent to nearly 50,000 tons of sulphate of ammonia.

The following suggestions have been drawn up with the object of securing better conservation of the fertilising constituents of farmyard manure :—

1.—*Manure Made from Fatting Beasts.*—If this is made in covered yards it should be left under the beasts until it is wanted or until it is necessary to empty the yard. Defective roofing and spouting should be made good as far as possible, to avoid washing by rain.

If made in open yards the manure should as soon as convenient be hauled out and tightly clamped. The dung heap should be as compact as possible; spreading over a wide area should be avoided as it always leads to loss. The position of the clamp is determined mainly by considerations of convenience, but preference should be given to sites well sheltered from rain and the prevailing wind. The clamp gains considerably in value if rain is kept out; rain not only washes out useful constituents, but it encourages certain destructive changes in the heap itself. The mischief is not entirely repaired by collecting and using the black liquid draining from the heap, though this should always be done. So important is the sheltering of the clamp that steps should be taken to give as much protection as possible. A layer of earth, several inches thick, put on directly the clamp is made, soaks up much of the rain and prevents undue leaching; straw-thatched hurdles have also answered well, and are usefnl in protecting a half-finished dung heap.

The losses brought about by the destructive changes in the clamp are intensified during the summer months, and as far as possible summer storage should be avoided. Even in autumn and winter there is some loss in the clamp no matter how efficiently it is shielded from the rain. The most economical plan, where it is possible, is to draw the manure from the yards straight on to the land and plough it in at once. Unfortunately this method cannot always be adopted.

2.—*Manure Made from Dairy Cattle.*—This has usually to be thrown out daily. It should be well protected from the rain. The worst plan is that too often seen where the manure is thrown out of the cow-sheds and left exposed to weather, with the result that streams of black liquid flow away. A much better plan is to convey the manure to a dungstead provided with a liquid-manure tank.

Where there is no dungstead the manure may be hauled straight on to the meadows in the autumn, and on to the arable land during winter and spring. During the summer it should be built up into a clamp, sheltered if possible from the sun. Special care should be taken of the liquid manure draining from the cow byres, as this contains valuable fertilising materials. It should be run into a tank and applied when convenient to the land. It may go on to grassland at almost any time, and to arable land after the autumn and before the middle or end of May.

Caerphilly Cheese (Requisition) Order, 1918.

AN Order (No. 860), dated the 13th July, 1918, has been made by the Food Controller and contains the following main provisions:—

1. This Order shall apply to all Caerphilly Cheese manufacturers in Great Britain on and after 29th July, 1918.

2. Every person who in Great Britain manufactures any Caerphilly Cheese to which this Order applies shall place all such cheese at the disposal of the Food Controller, and shall deliver the same to such persons and in such quantities and at such times as the Food Controller may from time to time prescribe by directions under this Order.

3. Pending any such direction no person concerned shall dispose of any such cheese, whether in pursuance of any contract or otherwise, and shall take such steps as may be reasonably necessary to preserve such cheese in good condition.

Note.—All correspondence with respect to this Order should be addressed to the Secretary, Ministry of Food (Cheese Section), New County Hall, London, S.E. 1.

Makers whose cheese is requisitioned will be required to deliver their cheese to the Food Controller through a factor nominated by them and approved by the Food Controller. *The official forms of nomination should be in the hands* of makers before the 19th July, 1918. Any maker who by that date has not received an official form of nomination should at once communicate with the Ministry of Food.

The British Cheese (Requisition) Order, 1918, and the Caerphilly Cheese (Requisition) Order, 1918: General Licence.

A GENERAL Licence (Order No. 861, 1918) has been issued by the Food Controller under the British Cheese (Requisition) Order, 1918 (No. 578*), and the Caerphilly Cheese Requisition) Order, 1918 (No. 860†), authorising every person from whom cheese is requisitioned under either of these Orders to continue until further notice to consume in his household, and to supply to his employees, and, in the case of a cheese factory, also to suppliers of milk to that factory and to the employees of such suppliers of milk, cheese for consumption in the households of recipients only at the first-hand price for the time being in force, provided that fortnightly returns are made to the Secretary, Ministry of Food (Cheese Section), New County Hall, Westminster Bridge Road, S.E. 1, showing the total quantities of cheese disposed of under this licence during the preceding fortnight and the number of persons supplied, together with such further particulars as may from time to time be required. The General Licence, dated the 29th May, 1918, issued under the British Cheese (Requisition) Order, 1918 (No. 579†), is revoked.

The British Cheese Order, 1917: Notice.‡

BY an Order (No. 884), dated 17th July, 1918, the Food Controller prescribes the prices set out in the following Schedule as the maximum first-hand prices in respect of the varieties of cheese therein stated.

THE SCHEDULE.

—	Maximum First-hand Prices for Delivery.	
	Before 8th August, 1918, inclusive.	On and after 9th August until further Notice.
	Per lb. s. d.	Per lb. s. d.
Caerphilly, whole milk	1 5½	1 6½
Caerphilly, partially skimmed, *i.e.* containing at least 25 per cent. of fat in the dry matter ..	1 4	1 5
Caerphilly, wholly skimmed, *i.e.*, containing less than 25 per cent. of fat in the dry matter ..	0 11	0 11
Any whole milk cheese not exceeding 2 lb. weight uncut, other than Caerphilly	1 9	1 10

* Printed in this *Journal*, July, 1918, p. 492. † See above.

‡ Printed in this *Journal*, November, 1917, p. 910; and January, 1918, p. 1140.

—	Maximum First-hand Prices for Cheese Manufactured.			
	Before 9th June, 1918.	On and after 9th June until 30th June, 1918, inclusive.	On and after 1st July, 1918, until 31st July, 1918, inclusive.	On and after 1st Aug., 1918, until further Notice.
	Per lb. s. d.	Per lb. s. d.	Per lb. s. d.	Per lb. s. d.
Ripened Stilton and Wensleydale (Blue)	1 7½	1 8½	1 10	1 10
Dorset hand skimmed (Blue)	1 2½	1 3	1 4	1 4½
„ separated (Blue) ..	1 0½	1 0½	1 0½	1 0½
„ „ (White) ..	0 11	0 11	0 11	0 11
All other whole milk cheese	1 4	1 5	1 7	1 8
All other partially skimmed cheese (*i.e.*, cheese containing at least 25 per cent. of fat in the dry matter) ..	1 0½	1 1	1 2	1 2½
All other wholly skimmed cheese (*i.e.*, cheese containing less than 25 per cent. of fat in the dry matter) ..	0 11	0 11	0 11	0 11

In all cases prices are ex Factory or ex Farm. All these prices are subject to the following terms :—

For cash within 7 days .. .. 2*d.* in the £ discount.
For cash within one month .. 1*d.* „ „

Wooden Cheese Moulds.

As there is a shortage of cheese-making appliances, the Food Controller has arranged for the manufacture of wooden cheese-moulds in two sizes, for 56-lb. and 28-lb. cheese (Cheddar shape), at prices ranging from 27*s.* 6*d.* and 18*s.* 9*d.*, respectively, downwards. Persons desiring to purchase moulds should apply at once to the Director of Milk Supplies, Section D.A., County Hall, Westminster, S.E. 1. The applications will be referred to such manufacturers as may at the time be best able to deal with them, and applicants will be advised of the action taken. Manufacturers will be entitled to require payment, at the price agreed with the Food Controller, on receipt of invoice. No remittances must be sent to the Food Controller. Persons requiring cheese-presses and vats are recommended to send to the Ministry (as above) copies of the orders which they lodge with manufacturers. (*National Food Journal*, 24th July, 1918.)

Export of Live Stock to Argentina.

THE following Notice, dated 1st August, 1918, has been issued by the Board :—The Board *of Agriculture and Fisheries have been officially* informed that the tattoo marks on all pedigree horned stock exported to Argentina must be very clear, in order to prevent any difficulty in securing the entry of the animal in the

Export of Live Stock into Ecuador.

THE Board of Agriculture and Fisheries have been officially informed that live stock imported into the Republic of Ecuador must be accompanied by a certificate from a duly qualified veterinary surgeon in the country of origin to the effect that the animals are in good health and suitable for breeding purposes. The certificate must be visé by the local Consul for Ecuador.

Report of the Animals Division of the Board for 1917.

THE Report of the Board for the year 1917 of the Proceedings under the Diseases of Animals Act, the Market and Fairs (Weighing of Cattle) Acts, etc., has recently been issued. Copies may be obtained from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 3*d.* net., excluding postage. It contains an account of the work done during 1917 with regard to Foot-and-Mouth Disease, Anthrax, Glanders and Farcy, Parasitic Mange, Sheep-scab, and Swine Fever. The Report notes the large increase of animals attacked by Parasitic Mange and Sheep-scab, the returns for these two diseases during the year under review comparing unfavourably with those of the previous year. On the other hand there has been a decided fall in the numbers of cases coming under the other diseases mentioned above.

An account also is given of the consignments of animals shipped from Ireland to Great Britain. The Report includes a list of the Orders made by the Board under the Diseases of Animals Acts during the year, and a number of useful statistical tables.

The Poultry and Game (Prices) Order, 1918.

AN Order (No. 886), dated 18th July, 1918, has been made by the Food Controller, fixing, with certain modifications and exceptions, the maximum prices for poultry and game. The prices given in the first column of the Schedule are for sales other than by retail, and those in the second column for sales by retail.

THE SCHEDULE.—*Maximum Prices for Poultry and Game.*

—	First Column.		Second Column.	
	At a Rate per lb. of	Not exceeding for any one Bird	At a Rate per lb. of	Not exceeding for any one Bird
	s. d.	*s. d.*	*s. d.*	*s. d.*
Cockerels, Pullets, Cocks and Hens	2 2	13 0	2 8	16 0
Guinea Fowls	—	5 6	—	7 0
Turkeys	2 2	—	2 8	—
Domestic Ducks	1 10	11 0	2 3	13 6
Geese	1 4	—	1 8	—
Grouse and Black Game (Young birds hatched in the year 1918 and sold prior to 1st November, 1918).	—	4 3	—	5 6
All other Grouse and Black Game	—	2 6	—	3 3

Minimum Rates of Wages, etc., Fixed by the Agricultural Wages Board.

THE rates of wages, hours, etc., stated below, have been fixed by the Agricultural Wages Board for the undermentioned counties. The rates fixed are on the basis of a six-day working week of 54 hours in the eight summer months from March to October inclusive, and of 48 hours in the four winter months from November to February inclusive, except in the case of Herefordshire where the number of hours during the summer months is 56.

District.	Wage.	Hours.	Overtime Rate.	Age.	Date of Coming into Force.
Leicestershire and Rutland ..	31*s*.	54 and 48	8½*d*. and 9*d*. weekdays, 9*d*. on Sundays.	18 years.	22nd July.
Dorset ..	30*s*.	54 ,, 48	—	18 ,,	,,
Gloucestershire ..	30*s*.	54 ,, 48	8½*d*. and 10*d*.	18 ,,	,,
Somerset ..	30*s*.	54 ,, 48	8½*d*. ,, 10*d*.	18 ,,	,,
Herefordshire ..	31*s*.	56 ,, 48	—	18 ,,	,,
Brecon and Radnor ..	30*s*.	54 ,, 48	—	18 ,,	,,
Kent ..	33*s*.	54 ,, 48	—	18 ,,	,,
Norfolk (Teammen)	36*s*.	Customary	8½*d*. and 10*d*.	18 ,,	29th July.
Norfolk (Overtime)	—	—	8½*d* ,, 10*d*.	18 ,,	5th August.
Derbyshire	31*s*.	54 and 48	9*d*.	18 ,,	,,
Cumberland, Westmorland, and the Furness District of Lancashire	35*s*.	54 ,, 48	10*d*. and 1*s*.	18 ,,	,,

Fire Safeguards on Farms.

THE following Memorandum (No. C.L. 68/C. 1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 31st July :—The question of taking measures to reduce the risk of loss by fire of farm produce has again been brought to the attention of the Department by the British Fire Prevention Committee in a letter of which a copy is appended.*

Copies of the warning notice† were circulated to Executive Committees with the Department's Memorandum dated 1st August, 1917. Should any of the Committees require reasonable supplies of the notice, either for their own use or for distribution, application should be made to the British Fire Prevention Committee for the requisite number of copies, giving particulars of the use or character of distribution entailed.

Committees are also invited to consider the suggestions made for securing that the notice shall receive as much publicity as possible in their respective counties.

* Not here printed. † Extract printed below.

EXTRACT.

THE following general hints have been issued by the British Fire Prevention Committee for the information of farmers :—

Prevention and Extinction of Fire on Farms.

A.—FIRE PREVENTION.—**1. Ricks.**—Great care should be taken in selecting their position.

They should be placed alongside a *private* road in the fields so as to allow of easy access, and as far as possible from any public road or footpath. They should not be placed within 50 yd. of a railway line, or nearer than 20 yd. to a building with a chimney.

Space (where possible 10 yd.) should be allowed between each, to avoid as far as possible the risk of fire spreading.

Ricks should not contain more than 30 tons of hay or 10 acres of corn in straw. (Square-built ricks are preferable to circular ones.) After they are thatched in the sides should be carefully trimmed down, and all loose material removed as far as practicable.

2. Dutch Barns.—The use of these should be avoided if possible. If required, they should be covered with galvanised iron (corrugated) and have partially-protected sides, and should be built so as to allow a clear space of at least 10 yd. away from farm buildings, and between each other.

3. *Loose Straw and Other Material* round ricks and buildings should be frequently cleared up, more especially near any building where oil, paraffin, petrol, or any other inflammable matter is stored or used.

4. Burning Rubbish.—Any rubbish that has to be destroyed must not be burnt near any rick or thatched building, and in any case only on the lee side of any rick, if there is any wind.

5. Portable Engines.—Steam engines should have spark arresters, and the fire or ash boxes should be maintained in good condition. When the ashes are raked out from the fire-box they should be at once thoroughly wetted, and when the fire is banked the damper put on the smoke pipe.

Petrol and oil engines require care in starting, and any replenishing of fuel should not be done near artificial light or by any person smoking.

6. Spontaneous Combustion.—The danger of fire from spontaneous combustion in ricks, etc., is known—but some chemicals used as artificial manures are also liable to overheat or ignite spontaneously, such as *nitrate of soda*, superphosphates, and lime.

7. Naked Lights should be avoided everywhere, and only enclosed lamps or lanterns used. Where oil lamps are used, they should be trimmed and filled in a separate shed.

8. Smoking should be strictly prohibited near any rick or barn.

B.—FIRE EXTINCTION.—**1. Water.**—Where there is no water supplied at pressure from mains, a good well with pump to elevated store cisterns (with taps) should be provided.

2. Tanks constructed of brick cemented internally, or of concrete, placed in convenient positions, and supplied by rain water from eaves of buildings, are also of great service.

3. Buckets.—At least six galvanised iron buckets hung on hooks and kept filled with water for every rick or barn, and three additional ones to every two further ricks or barn in one group should be provided [illegible]

both by day and night. These buckets should be painted red, and on no account be used for any other purpose.

4. Water Barrels.—Every farm should be provided with two or more portable water barrels and a large size "Brigade Hand Pump," or with a small "Garden Engine" on wheels. With either of these, a fire on roof or rick which cannot be attacked by buckets only, may be easily checked, and sometimes extinguished. Care should be taken, however, to see that the barrels and appliances are kept in good order and nearly full of water.

5. Ladders.—One light 30 or 35-round ladder and one 20-round ladder should be kept near buckets in shed and be always available for use.

6. Rick Cloths.—One large and one smaller cloth should also be kept where easily available, and should be placed on the ricks or thatched buildings in danger from fire, and water thrown on them by means of hand-pumps or buckets to prevent the fire spreading thereto.

7. Other Appliances.—Three or 4 cutting knives, 2 or 3 dung drags, 6 to a dozen stable prongs, and about 40 to 50 yards of strong steel wire rope, with loops at end, for pulling ricks to pieces, should also be provided.

Hay knives, when not in use, should not be left stuck into a rick, but kept in some appointed place.

8. Fire Engine Facilities.—If the fire engine is to draw from a pond or shallow stream, a suitable position for the engine and a sump for the suction should be prepared.

Ponds and streams should be frequently cleared of mud. The latter may often be dammed at a convenient spot to conserve a supply of water. Where a running stream is not permanently dammed, steps should be taken immediately upon the outbreak of fire to collect a good head of water for the fire brigade on its arrival. Sacks of earth, sand, etc., will be found useful for this purpose.

Certain other directions are given, dealing with the way in which an alarm of fire should be given: the action to be taken in the event of an outbreak of fire on a farm; the setting of a watch and its nature; and the prevention of strangers from sleeping in barns. Copies of this "Warning" are provided where desired upon written application with postage to the offices of the British Fire Prevention Committee, 8, Waterloo Place, London, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board towards the end of June:—

Farmers and Air Insurance.

Farmers will do well to consider the desirability of insuring against damage by aircraft if they have not already done so. The likelihood of such damage being incurred may be greater or less at the present time than it was last February, when the Food Production Department advised farmers to insure*; but anyway it is not, and cannot in the nature of the case be entirely negligible. For example, in certain areas there is undoubtedly some risk of injury to crops or stock or buildings by our own aircraft, and this possibility has been keenly discussed at various places where farmers congregate, during the past few months.

* See this *Journal*, March, 1918, p. 1486.

It may be useful to agriculturists to be reminded that they can insure against all reasonable risks in return for very modest premiums, and that full particulars are obtainable at the War Risks Insurance Office (Aircraft Department), 33, King William Street, London, E.C. Farmers whose total property exceeds £500 in value can only claim compensation from the Government for damage by aircraft if the value in excess of £500 is insured under the Government Aircraft and Bombardment Insurance scheme. Farmers whose total property is under £500 in value—they are comparatively few—can claim compensation to the extent of the actual damage done to that property, whether the property is insured or not. Notice of damage must be sent to the Insurance Company if the property is either wholly or partly insured, and to the Air Raid Compensation Committee at 51, Palmerston House, Old Broad Street, London E.C., if it is not insured. The Defence of the Realm (Losses) Commission (to whom certain farmers seem to have made application) have nothing to do with these claims.

Central Agricultural Advisory Council.

THE first and second meetings of the Central Advisory Agricultural Council (see p. 517 of this *Journal*) were held on the 16th July and 6th August last respectively, Lord Selborne presiding.

At the first meeting a report from Mr. Buckley, the Director of Milk Production, was read, and a short discussion followed. It was decided that the Council should come to no conclusion on this matter until the further inquiries which were then being made by the Sub-Committee of Major Astor's Committee on the Production, Utilisation and Distribution of Milk, had been completed.

The draft Grain (Prices) Order, 1918, was discussed, and as a result it was agreed: (1) that the Council make a representation to the Board of Agriculture, the Ministry of Food, and the Royal Commission on Wheat Supplies, that in its opinion actual producers of cereals should receive adequate representation on the Home Cereals Committee of the Wheat Commission; and (2) that a deputation from the Council should wait upon the Home Cereals Committee on Thursday, 18th July, urging that the prices should be, wheat and rye, 80*s.* per qr. of 504 lb. in October, 1918, rising by 6*d.* per month till June, 1919; milling barley, 67*s.* 6*d.* per qr. of 448 lb.; malting barley, 72*s.* 6*d.* per qr. of 448 lb.; oats, 50*s.* per qr. of 336 lb. in October, 1918, rising by 6*d.* per month till June, 1919.

At the second meeting Mr. Overman submitted a report of the deputation from the Council to the Home Cereals Committee on 18th July, 1918. The question of this year's prices for cereals was further discussed, and Sir Charles Bathurst pointed out that the recent bad weather and consequent postponement of the harvest provided further reasons for increasing the prices. As in the course of discussion it appeared that several members were under a misapprehension as to the attitude and action of the Board of Agriculture in the matter, Sir Daniel Hall stated that Mr. Prothero had, in fact, awaited the advice of the Council before expressing the Board's opinion on the draft Grain (Prices) Order, and that a reasoned letter had since been sent to the Food Controller generally supporting the prices put forward by the deputation. Sir W. Roffey stated that the matter was still

under the consideration of the Food Controller, and that he could make no announcement at the moment.

It was agreed that representation on the Council should be granted only to societies which are national in character, and that where there is more than one such society formed for the same purpose it should only be granted to that which is substantially the largest. Representation was not therefore accorded to the British Berkshire Society or to the National Union of Allotment Holders.

Lord Selborne moved, seconded by Mr. Elder: "That the President of the Board of Agriculture be requested to communicate with all other Government Departments which fix the price of agricultural products, and to request them to give this Council an early opportunity of expressing its views before they proceed to fix such prices." This was carried unanimously.

General Morgan, Administrative Member of the Forage Committee of the War Office, who was present by invitation, made a statement as to the fixing of the prices for hay and straw by the Army Council. It was afterwards proposed that the Army Council be requested not to issue any order as to the price of 1918 hay until it had heard the views of the Council. An amendment was moved and carried: "That it be a recommendation to the Army Council from the Central Agricultural Advisory Council not to fix the 1918 price of hay below £8 per ton without previously consulting the Council."

It was agreed that the Council should point out the danger of storing large quantities of cake, especially undecorticated cotton cake, under the authority of the Ministry of Food, and it was suggested that limited quantities should be released to farmers, more especially dairy farmers. Mr. Wise made a statement as to the present position with regard to tonnage for feeding-stuffs and the conditions under which feeding cake is being stored by the Ministry of Food.

A representative of the Ministry of Food also made a statement as to the action which that Department propose to take for dealing with the 1918 potato crop.

On the question of the shortage of labour for the harvest, the Council passed a resolution that the President of the Board of Agriculture request the Army Council to allow as many soldiers as possible who are skilled in agriculture to be placed at the disposal of the farmers at harvest time.

Committee to Study the Habits of Honey Bees.

THE Board of Agriculture and Fisheries have appointed a Committee to study the life habits of the honey bee, with the object of improving the conditions under which bee-keeping is carried on in England and Wales, and to investigate the epidemic diseases of the bee, more especially the disease or group of diseases which pass under the name of "Isle of Wight" Disease. The Committee consists of:—

- The Master of Christ's College, Cambridge University (Dr. A. E. Shipley, F.R.S.).
- Professor Punnett, F.R.S. (Professor of Genetics, Cambridge University).
- Dr. G. S. Graham Smith, M.D.
- Professor G. C. Bourne, F.R.S., D.Sc. (Professor of Zoology and Comparative Anatomy, Oxford University).
- Professor W. Somerville (Professor of Rural Economy, Oxford University).

Mr. T. W. Cowan (Chairman of the British Bee-keepers' Association).
Mr. G. W. Bullamore.
Mr. J. C. Bee Mason.
Mr. A. G. L. Rogers (Head of the Horticulture Branch, Board of Agriculture and Fisheries).
Mr. R. H. Adie will act as Secretary.

It is proposed to undertake the study of healthy bees at Cambridge, and the investigations on "Isle of Wight" Disease at Oxford. The Committee would be glad to receive specimens of bees suspected of suffering from "Isle of Wight" Disease for examination and experiment. Communications on this subject should be addressed to Mr. Rogers, at 4, Whitehall Place, London, S.W. 1.

Swanley Horticultural Course.

THE Food Production Department of the Board of Agriculture announce that they are offering ten scholarships tenable at the Horticultural College, Swanley, Kent, for a course of commercial horticulture of about 38 weeks' duration. The course will commence on or about 19th September.

Preference will be given to candidates over 21 years of age who are suitable by education and former experience for the positions of forewomen, managers, etc. *Accepted candidates will be expected to join the Land Army.*

There will also be a few vacancies for paying students who wish to attend the same course. Students who are desirous of paying for themselves can obtain full particulars as to charges, etc., from *The Principal, The Horticultural College, Swanley, Kent.* All applicants are asked to provide two testimonials and give the names of two references. Application forms for the scholarships can be procured from *The Women's Branch, Food Production Department, 72, Victoria Street, S.W. 1.* Application forms for students who are desirous of paying their own fees can be obtained from *The Principal, Horticultural College, Swanley, Kent.*

Notes on Feeding Stuffs in July: A Correction.

THE Board desire to correct an error which appeared in the Table of Prices, etc., of Feeding Stuffs on p. 329 of the *Journal* for June last. Under the heading *Compound Cakes* the statement "Containing not less than 6 per cent. of oil and 20 per cent. of protein, £16 17*s.* 6*d.*" is inaccurate; for the figure 20, the figure 17 should be substituted.

Prosecutions of Farmers, etc., under Statutory Rules and Orders.

Hull.—Oswald Smith, farmer, Dunswell, on sales of adulterated milk, £75.

Petworth.—Arthur Standing, Brighton, was fined £45, with 5 guineas costs, for buying nine fat beasts outside a market; and John Gibbons Edgar, Stag Park, £5 for selling them. Notice of appeal was given.

Ramsgate.—Charles and Bernard Philpott, dairy farmers, on sales of milk to retailers, £168. The price charged was 1*s.* 7*d.*, instead of 1*s.*, per gal. The defendants pleaded that the difference had been credited to their customers after an ineffectual attempt to get the maximum raised.

NOTICE OF BOOKS.

British Pigs: The Art of Making them Pay.—James Long (London: Chapman and Hall, 1918, 4*s.* net.).—The author in this work has set out the lines on which pig-keeping in this country might be made a larger and more profitable industry. He shows the great extent to which we have been dependent on foreign supplies for our bacon and hams, and claims that with better management pig-keeping could be made a more thriving home industry. The different kinds of British breeds are dealt with in an early chapter, which is well illustrated, while under the heading "Breeding and Management" is included information in connection with the sow, litters, weaning, selling to fatten, etc. In subsequent chapters, feeding, the functions of food, the small pig-keeper, the piggery and its equipment, slaughtering, bacon and hams, and the simpler diseases of the pig, all receive attention.

Rothamsted Experimental Station, Harpenden, Report, 1915-17 (Harpenden, 1918).—The Report of the Rothamsted Experimental Station for the period 1915-17, with a Supplement to the "Guide to the Experimental Plots," containing the Yields per Acre, etc., has recently been issued. The main work of the Station is considered under four headings: (1) Economical Use of Manures and Fertilisers, (2) The Breaking up of Grass Land, (3) The Study of the Organisms of the Soil, and (4) Plant Nutrition Problems. A Report on Farm and Experimental Plots during the seasons 1914-1917 is also given, as well as tables of field trials, etc. A list of papers published by the Station, including soil problems, farmyard-manure, plant-nutrition problems, and technical papers, is also included in the Report. Copies may be obtained from the Director, Rothamsted Experiment Station, Harpenden, Herts, price 1*s.*, including postage.

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for July, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat*—The production in Canada, United States, British India, and Tunis is estimated at 192,195,000 qr. in 1918, against 158,803,000 qr. in 1917, or an increase of 21·0 per cent. *Rye*—The estimated production in Canada and the United States is placed at 9,900,000 qr. this year, or an increase of 32·6 per cent. compared with last year, when it amounted to 7,465,000 qr. *Barley*—The production in Canada, United States, and Tunis is estimated to amount to 39,007,000 qr. in 1918, against 32,666,000 qr. in 1917, or an increase of 19·4 per cent. *Oats*—It is estimated that the total yield in Canada, United States, and Tunis will amount to 195,038,000 qr. in 1918, against 207,068,000 qr. in 1917, or a decrease of 5·8 per cent. *Maize*—The production in the United States is estimated at 368,560,000 qr. this year, or practically the same as in 1917.

The condition of the crops in other countries on the 1st July, 1918, is given as follows (100 being taken to represent the average yield in the last 10 years):—*Wheat*—Denmark, 100; England and Wales, 103; Scotland, Ireland, and Sweden, 105; Switzerland, 98. *Rye*—Denmark, 100; Ireland, 105; Sweden, 103; Switzerland, 102. *Barley*—Denmark,

80; England and Wales, 98; Scotland, 95; Ireland, 115; Sweden, 98; Switzerland, 100. *Oats*—Denmark, 80; England and Wales, 95; Scotland, 90; Ireland, 105; Sweden, 98; Switzerland, 94.

France.—According to an official estimate, the condition of crops on 1st July was as follows (last year's figures are in brackets; 80 = good, 60 = fairly good, 50 = mediocre) :—Winter wheat, 72 (61); spring wheat, 63 (65); winter barley, 73 (63); spring barley, 59 (70); winter oats, 68 (60); spring oats, 57 (70); maize, 62 (71); rye, 73 (65); potatoes, 60 (76). Spring crops, however, have improved since the rains came and the final results for these crops may be better than is indicated by the above figures. (*Broomhall's Corn Trade News*, 6th August, 1918.)

Italy.—According to an official estimate the wheat crop for 1918 is given as 22,000,000 qr. against 17,500,000 qr. last year. (*Broomhall's Corn Trade News*, 30th July, 1918.)

Canada.—According to official returns the area sown to wheat in Canada amounts to 15,838,000 acres, against 14,755,850 acres last year; and to oats 13,784,000 acres, against 13,313,400 acres last year. (*The London Grain, Seed and Oil Reporter*, 19th July, 1918.)

Japan.—According to a report from H.M. Ambassador at Tokio, under date 20th July, the first estimates of the year's crops in Japan are (last year's figures in brackets) :—Wheat, 3,720,000 qr. (4,200,000); barley, 4,836,000 qr. (5,460,000); rye, 4,712,000 qr. (5,000,000). (*The London Grain, Seed and Oil Reporter*, 2nd August, 1918.)

Agricultural Conditions in England and Wales on 1st August.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st August, generally refer to the beneficial effects upon the crops of the rains that set in towards the middle of July. The storms were often violent, and a certain amount of corn, especially among the heavier crops, has been laid by them; but the damage is small compared with the general improvement that has occurred since the drought was broken.

Wheat is a very healthy and satisfactory crop everywhere, and in no district is a yield under average expected; while in the great corn-growing districts of the east it is fully 5 per cent. above average. It is distinctly the best crop of the year, and the straw is generally of good length. Barley on the whole is a little under average; only in the south-western counties are normal crops reported. Oats have received more benefit from the rain than the other cereals, and a decided improvement in their prospects may be noted, although except in the south-west and Wales, the yield will probably prove under average, and the straw is generally short. Beans and peas are generally satisfactory crops, and the yield is expected to be about average; they are best in the eastern counties.

Potatoes have also been improved by the rain; they are uniformly vigorous and promising, and a yield over average is looked for, with very few exceptions. Few reports of potato disease have come to hand, and the crop may be, so far, said to be unusually healthy.

Turnips and swedes suffered considerably from the drought. The earliest sown are generally fairly satisfactory, but the later fields were badly attacked by fly, and generally failed, so that much resowing was necessary. With the rain, however, the crops made a good start, and they are now growing vigorously; but they are naturally very backward, so that in few districts is anything like an average yield expected.

Mangolds have in some districts made remarkable improvement with the rain. of which they stood in much need, particularly in the midlands and east; in others, such as the north and some southern counties, prospects are hardly as good as a month ago. Taking the country as a whole, an improvement is to be recorded, but only Yorkshire among the districts mentioned below expects an over average yield.

Hay which was cut in good time and got in not later than the early days of July, was secured rapidly and in excellent condition; but that which was cut later has suffered some damage from the continuous rains; this has affected the north more than the south, and meadow hay to a greater extent than the clover. The yield of the latter is probably just under average; but prospects for meadow hay have consequently deteriorated somewhat.

The rain has also been of advantage to the hops, which were short in bine, and suffered badly from insect attacks, which have been very prevalent this year. The western district shows the poorest prospects. The probable yield still remains as a month ago, viz., seven-tenths of an average; there being perhaps a slight improvement in the west and a slight deterioration in Sussex.

Prospects for orchard fruit are still very poor, and hardly a reporter mentions the probability of an average crop of tree fruit anywhere in the country. Of small fruit, there have been a few good crops of raspberries, currants, and gooseberries, but these are in the minority, and fruit altogether has been disappointing.

Pastures have become fairly full of grass again since the rain, after having been very bare; and live stock have begun to show a marked improvement in consequence; they are healthy and in satisfactory condition.

Labour, especially skilled and casual labour, is very deficient, but most of the work has been done with the aid of women, boys, and German prisoners.

Summarising the returns, and expressing an average crop by 100, the appearance of the crops on the 1st August indicated probable yields per acre which may be denoted by the following percentages; Wheat, 104; barley, 98; oats, 97; beans, 100; peas, 98; potatoes, 102; mangolds, 95; seeds hay, 99; meadow hay, 95; and hops, 70.

THE following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Agricultural Labour in England and Wales during July.

Northumberland, Durham, Cumberland, and Westmorland.—Skilled and casual labour is extremely scarce, although the shortage is less acute in some districts; favourable weather conditions have eased the situation somewhat.

Lancashire and Cheshire.—Labour is everywhere deficient and casual workers are difficult to obtain.

Yorkshire.—The usual skilled male labour is now almost unobtainable, but the work is kept fairly well in hand by substitutes.

Shropshire and Stafford.—Conditions remain very much the same. All labour is scarce, and it is difficult to get hoeing done, but, with the help of soldiers and women, work has been so far kept in hand.

Derby, Nottingham, Leicester, and Rutland.—Skilled labour is deficient, but the work is being done, more or less efficiently, by substitutes.

Lincoln and Norfolk.—The usual skilled labour is deficient, but the immediate need is being met by substitutes.

Suffolk, Cambridge, and Huntingdon.—Labour is still very scarce, but sufficient to keep necessary work in hand.

Bedford, Northampton, and Warwick.—The usual labour is deficient, but the work has been kept in hand by substitutes.

Buckingham, Oxford, and Berkshire.—Though the supply of labour, especially skilled, is deficient, great assistance has been rendered by soldiers, women, and German prisoners, and the work has generally been got through satisfactorily.

Worcester, Hereford, and Gloucester.—The supply of labour is short, but much assistance has been given by war agricultural volunteers.

Cornwall, Devon, and Somerset.—Labour is very short, especially skilled hands, and farmers are becoming anxious about the labour required for hoeing the roots and getting in the corn. Help is being given by women and German prisoners.

Dorset, Wiltshire, and Hampshire.—Labour is scarce, and few casual workers are available for turnip hoeing. Assistance is being rendered by women, boys, and German prisoners.

Surrey, Kent, and Sussex.—Labour is generally short, but assistance has been rendered by women, soldiers and German prisoners.

Essex, Hertford, and Middlesex.—Conditions are much the same as last month, and the shortage is being fairly well met. Wages still tend to increase.

North Wales.—The supply of labour is deficient, but generally, with the assistance of temporary labour, most of the work has been got through, though roots would sometimes benefit with more attention were additional labour available.

Mid Wales.—The supply of labour is deficient in all districts, but the shortage is less felt in some districts than in others.

South Wales.—Labour is scarce and temporary help often inefficient, but so far the necessary work has been accomplished.

THE following statement shows that according to the information in the possession of the Board on 1st August, 1918, certain diseases of animals existed in the countries specified :—

Prevalence of Animal Diseases on the Continent.

Austria (on 26th June).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of May).—Anthrax, Swine Erysipelas.

France (for the period 16th June—6th July).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-pox, Swine Erysipelas, Swine Fever.

Holland (month of June).—Anthrax, Foot-rot, Swine Erysipelas.

Hungary (on the 26th June).—Foot-and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Italy (for the period 1st—6th July).—Anthrax, Black-leg, Foot-and-Mouth Disease (1,435 outbreaks), Glanders, Sheep-scab, Swine Fever, Tuberculosis.

Norway (month of June).—Anthrax.

Sweden (month of June).—Anthrax, Black-leg, Swine Fever, Swine Erysipelas.

Switzerland (for the period 17th—23rd June).—Anthrax, Black-leg, Swine Fever.

No further returns have been received in respect of the following countries : Belgium, Bulgaria, Germany, Montenegro, Rumania, Russia,

The Weather in England during July.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.		Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 6th July :								
England, N.E. ...	58·6	+0·3	0·03	1	−12	1	7·6	+1·2
England, E.	60·0	+0·1	0·00	0	−11	0	8·5	+1·4
Midland Counties ...	60·4	+0·9	0·01	0	−11	1	8·6	+2·1
England, S.E. ...	60·6	+0·1	0·00	0	−11	0	9·5	+2·1
England, N.W. ...	58·2	0·0	0·01	0	−13	1	7·7	+1·3
England, S.W. ...	60·8	+1·6	0·00	0	−13	0	10·7	+3·7
English Channel ...	60·9	+0·7	0·00	0	−12	0	12·8	+4·5
Week ending 13th July :								
England, N.E. ...	56·6	−2·1	0·57	14	+ 1	5	6·5	+0·3
England, E.	58·4	−1·9	0·81	21	+ 8	4	6·8	0·0
Midland Counties ...	57·0	−2·7	0·83	21	+ 8	5	6·4	+0·4
England, S.E. ...	58·8	-2·5	1·38	35	+11	5	7·3	+0·1
England, N.W. ...	55·0	3·6	0·61	15	− 2	5	6·4	+0·1
England, S.W. ..	56·8	2·7	1·35	34	+18	5	8·6	+2·1
English Channel ...	59·1	·1·8	0·69	17	+ 5	5	9·8	+1·8
Week ending 20th July :								
England, N.E. ...	61·7	+2·8	1·72	44	+29	6	6·0	+0·3
England, E.	62·6	+1·6	1·79	46	+31	6	5·1	−1·4
Midland Counties ...	61·3	+1·0	1·44	37	+25	6	3·9	−1·7
England, S.E. ...	61·8	+0·3	1·28	33	+20	6	3·4	−3·3
England, N.W. ...	60·4	+1·4	2·06	52	+35	7	4·5	−1·0
England, S.W. ...	60·0	0·0	1·38	35	+17	7	3·1	−3·0
English Channel ...	62·2	+0·9	1·73	44	+31	7	4·9	−2·4
Week ending 27th July :								
England, N.E. ...	58·2	−0·1	1·06	27	+ 9	6	5·2	0·0
England, E.	60·0	−0·3	1·07	27	+12	6	5·7	−0·2
Midland Counties ...	58·6	−1·0	0·93	24	+ 5	6	5·4	+0·1
England, S.E. ...	60·0	−1·2	1·77	45	+30	6	5·7	+0·3
England, N.W. ...	57·7	−1·0	1·05	27	+ 5	6	4·9	+0·3
England, S.W. ...	58·8	−1·0	1·55	39	+18	6	7·5	+1·8
English Channel ...	60·4	−0·9	0·67	17	+ 2	4	8·4	+1·5

* 1 inch = 25·4 millimetres.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of July, 1916, 1917, and 1918.

—	Wheat. 1916.	Wheat. 1917.	Wheat. 1918.	Barley. 1916.	Barley. 1917.	Barley. 1918.	Oats. 1916.	Oats. 1917.	Oats. 1918.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ...	50 11	79 7	75 1	48 6	65 7	64 3	33 4	54 9	46 1
Norwich ...	50 0	77 11	74 8	—	67 2	56 6	32 1	55 0	45 [illegible]
Peterborough	49 11	78 8	74 6	44 6	65 1	56 5	31 11	54 11	—
Lincoln ...	52 5	78 1	74 10	46 10	65 7	56 8	32 1	56 0	—
Doncaster ...	48 9	77 11	74 0	—	65 4	56 5	31 7	55 6	45 1
Salisbury ...	50 10	78 5	73 11	49 1	74 4	56 1	31 0	54 11	45 9

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	Wheat.						Barley.						Oats.					
	1916.		1917.		1918.		1916		1917.		1918.		1916.		1917.		1918.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*
Jan. 5...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
" 12...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
" 19...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
" 26...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
" 9...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
" 16...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
" 23...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
" 9...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
" 16...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
" 23...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
" 30...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl. 6...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
" 13...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
" 20...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
" 27...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May 4...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
" 11...	55	5	78	0	73	5	53	5	64	11	56	6	33	1	55	2	47	6
" 18...	55	0	77	11	73	4	52	10	64	10	56	6	33	0	55	2	46	4
" 25...	54	7	78	0	73	3	52	9	64	9	56	6	33	4	54	11	47	8
June 1...	53	3	78	0	73	8	53	9	65	11	60	0	33	3	54	11	44	9
" 8...	51	2	78	0	73	11	52	8	67	7	59	2	32	7	55	0	45	5
" 15...	48	10	78	2	74	3	50	9	75	6	57	9	32	1	55	1	45	7
" 22...	47	6	78	1	74	4	49	10	75	0	58	5	31	3	55	2	47	8
" 29...	46	3	78	3	74	4	49	1	73	11	57	10	30	10	55	1	46	4
July 6...	46	3	78	1	74	4	45	6	69	5	61	7	30	8	55	2	46	10
" 13...	48	11	78	2	74	4	47	5	70	10	57	5	31	6	55	1	47	0
" 20...	51	6	78	3	74	3	48	8	72	1	60	5	32	3	55	2	45	4
" 27...	53	5	78	3	74	3	47	2	65	7	56	11	32	5	55	2	46	2
Aug. 3...	55	1	78	2	74	3	46	1	73	6	57	1	32	9	55	0	45	10
" 10...	56	7	78	4	74	7	46	11	76	1	57	7	31	2	55	0	46	3
" 17...	58	1	78	7			48	0	68	11			30	8	55	6		
" 24...	59	0	76	7			47	1	70	7			31	6	54	7		
" 31...	59	4	72	1			48	5	60	4			30	5	49	0		
Sept. 7...	59	3	71	6			51	7	59	3			31	1	46	7		
" 14...	59	11	70	7			52	6	57	2			30	9	45	0		
" 21...	59	4	70	8			53	3	56	10			30	9	45	8		
" 28...	58	10	70	6			54	1	58	5			31	1	44	7		
Oct. 5...	59	2	70	8			54	5	57	9			30	9	44	9		
" 12...	59	7	71	0			53	10	58	5			31	6	44	5		
" 19...	60	9	70	8			53	8	59	3			31	11	44	1		
" 26...	62	10	70	10			54	6	60	1			32	10	43	0		
Nov. 2...	66	7	70	4			56	2	59	11			34	0	42	4		
" 9...	69	8	70	3			58	0	60	2			35	8	42	11		
" 16...	70	9	70	3			59	8	60	2			37	8	43	0		
" 23...	70	8	70	2			61	8	59	9			39	7	43	1		
" 30...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec. 7...	72	1	70	7			65	6	58	7			44	1	43	5		
" 14...	73	2	71	2			66	5	58	0			45	10	43	6		
" 21...	74	8	71	2			67	3	57	7			46	5	44	2		
" 28...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in July and June, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	July. First Grade.	July. Second Grade.	June. First Grade.	June. Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight	per cwt. live weight
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	75 3	70 0	75 2	70 6
Herefords	75 3	70 0	75 4	70 0
Shorthorns	75 2	69 11	75 0	69 11
Devons	75 6	70 0	75 2	70 1
Welsh Runts	75 0	70 0	75 0	—
Fat Cows	70 0	61 11	69 11	62 1
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d.
Veal Calves	16¾	13	16½	14½
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	51 3	39 6	49 6	38 2
,, —Calvers ...	47 18	37 17	45 13	37 1
Other Breeds—In Milk ...	45 7	36 13	44 3	35 11
,, —Calvers ...	35 0	33 10	32 10	27 0
Calves for Rearing	4 6	3 1	4 14	3 8
Store Cattle :—				
Shorthorns—Yearlings ...	17 5	14 10	18 8	15 7
,, —Two-year-olds...	27 1	22 11	28 4	23 8
,, —Three-year-olds	34 15	30 12	37 8	33 2
Herefords—Two-year-olds...	31 0	25 11	29 14	26 13
Devons— ,,	28 19	24 8	30 13	26 4
Welsh Runts— ,,	25 5	23 0	26 6	22 14
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	53 1	45 0	77 5	61 9
Store Pigs :—				
8 to 12 weeks old	57 4	42 4	64 10	49 8
12 to 16 ,, ,, ...	20 7	71 6	98 3	76 6

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during July made prices equivalent to an additional *1d. per lb. of the carcass weight for Downs, Longwools, Cheviots,* Blackfaced, Welsh, and Cross-breds, and during June 1d. per lb. for

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in July, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	114 6	114 6	—	114 6	114 6
	2nd	114 6	114 6	—	114 6	114 6
Cow and Bull	1st	114 6	114 6	114 6	114 6	114 6
	2nd	114 6	114 6	94 0	105 6	106 6
Irish : Port Killed ...	1st	—	—	114 6	—	114 6
	2nd	—	—	112 0	—	114 6
Argentine Frozen—						
Hind Quarters ...	1st	129 6	129 6	129 6	129 6	129 6
Fore ,, ...	1st	99 0	99 0	99 0	99 0	99 0
American Frozen—						
Hind Quarters ...	1st	127 0	—	—	127 0	—
Fore ,, ...	1st	97 0	—	—	97 0	—
Canadian Frozen—						
Hind Quarters ...	1st	120 0	129 6	—	126 6	—
Fore ,, ...	1st	90 0	99 0	—	96 6	—
VEAL :—						
British	1st	—	114 6	112 6	114 6	112 6
	2nd	—	112 6	89 6	94 6	92 6
Foreign	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	121 6	121 6	—	121 6	121 6
	2nd	121 6	121 6	—	121 6	121 6
English	1st	121 6	121 6	—	121 6	121 6
	2nd	121 6	121 6	—	121 6	121 6
Irish : Port Killed ...	1st	—	—	121 6	—	121 6
	2nd	—	—	121 6	—	121 6
Argentine Frozen ...	1st	121 6	121 6	121 6	121 6	121 6
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	121 6	121 6	121 6	121 6	121 6
	2nd	121 6	121 6	121 6	121 6	121 6
New Zealand	1st	121 6	121 6	121 6	121 6	121 6
Australian...	1st	—	—	—	—	—
Argentine	1st	121 6	121 6	121 6	121 6	121 6
PORK :—						
British	1st	—	149 6	149 6	149 6	—
	2nd	—	149 6	—	149 6	—
Frozen	1st	—	149 6	—	149 6	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in July, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol. First Quality.	Bristol. Second Quality.	Liverpool. First Quality.	Liverpool. Second Quality.	London. First Quality.	London. Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	28 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	233 6	—	233 6	—	233 6	—
CHEESE :—						
British—						
Cheddar	160 6	—	—	—	161 6	—
			120 lb.		120 lb.	
Cheshire	—	—	171 6	—	172 0	—
			per cwt.		per cwt.	
Canadian	137 0	—	137 0	—	137 0	—
BACON :—						
Irish (Green)	—	—	—	—	—	—
Canadian (Green sides)	182 0	—	182 0	—	182 0	181 0
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	175 6	—	175 0	—	175 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	45 7	43 1
Irish	42 11	—	41 11	40 6	43 7	41 7
Egyptian	—	—	—	—	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Duke of York	253 6	183 6	—	—	260 0	235 0
White Kidney ...	233 6	188 6	278 6	236 6	268 6	236 6
Other First Earlies ...	261 6	173 6	228 6	193 6	240 0	211 6
HAY :—						
Clover	—	—	—	—	157 6	150 0
Meadow	—	—	—	—	157 6	150 0

DISEASES OF ANIMALS ACTS, 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	JULY.		SEVEN MONTHS ENDED JULY.	
	1918	1917.*	1918.	1917.
Anthrax:—				
Outbreaks	12	18	155	311
Animals attacked	12	20	173	356
Glanders (including Farcy):—				
Outbreaks	4	2	23	16
Animals attacked	9	2	64	28
Parasitic Mange:—				
Outbreaks	246	151	3,245	1,735
Animals attacked	451	232	6,187	3,400
Sheep-scab:—				
Outbreaks	2	8	246	391
Swine Fever:—				
Outbreaks	157	163	876	1,575
Swine slaughtered as diseased or exposed to infection	86	71	346	680

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	TWO WEEKS TO 13TH JULY.		28 WEEKS ENDED 13TH JULY.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange:—				
Outbreaks	3	1	79	29
Sheep-scab:—				
Outbreaks	7	2	182	235
Swine Fever:—				
Outbreaks	1	9	12	150
Swine slaughtered as diseased or exposed to infection	14	29	45	960

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EDITORIAL NOTES.

Beef Production.

QUESTIONS relative to the economic production of beef and to the most suitable time at which cattle should be sold for slaughter are of very considerable importance. Many authorities have long been convinced, in part from observation and in part from experimental results, that beef cattle generally are fed too long, are given an unnecessary quantity of concentrated food, and are fattened to an extent which constitutes a national economic loss. In this *Journal* for August appeared an account by Professor Wood of feeding trials which showed that many cattle are given much more cake than is really necessary to secure good results. Figures were given showing that on a low cake ration last year 178½ lb. of cake resulted in the production of 655 lb. of meat. In the Norfolk experiments of 1896-9 with a ration of 8 lb. of cake per head per day, 1,064 lb. of cake produced only a further 66 lb. of meat. The figures show that the decrease in cake consumption from 8 lb. to 1½ lb. per head per day only reduced the live weight produced by 3·3 per cent. and the meat by 9 per cent., whilst, taking the point of view of profit, for each extra pound of beef produced 13 lb. of cake, costing about 2*s*., was consumed. The article generally indicates a low cake ration rather than a high one.

In the present issue of the *Journal* (p. 623) appears a paper on Beef Production by Messrs. Mackenzie and Marshall which deals with problems relating to the most economic condition at which cattle should be sold and the best means by which that condition can be ascertained. It is shown that as compared with the production of "baby" beef, it is not an economic policy to fatten 2½-year-old bullocks; that there is

more waste in consumption of "fat" beef than in the case of beef from so-called inferior animals, and that while waiting for an animal to become what we have been taught to look upon as "prime" we may allow a total loss of 9 lb. of good meat every month of the animal's life so as to get part of the carcass as very fat meat and the rest as dripping. It is held that at the present moment far too many beasts are left unslaughtered until the most economic time for killing has passed and the beasts' usefulness has diminished. The fattening of the older animals to produce "prime" beef leads to the laying on of fat at the expense of meat production. Economy in beef production may best be secured by growing "baby" beef, though this may be difficult to carry out on farms which do no rearing but depend upon the winter feeding of bought stores. All who are interested in the production of meat should read very carefully the article by Messrs. Mackenzie and Marshall.

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Seed Testing.

ELSEWHERE in this issue (p. 641) will be found a report of the Official Seed Testing Station, which was opened on the 14th November, 1917. The use of pure seed of high germinating capacity has always been important, but is specially so at the present time as one of the chief means of ensuring good crops. The results of the seed testing conducted at the official station are of special interest to both farmers and seedsmen, who will find in the report a detailed review of the results obtained in the season ($8\frac{1}{2}$ months) ended 31st July last.

Two leaflets which are of particular interest to farmers are Leaflet No. 297 (*Seed Testing*) and Food Production Leaflet No. 47 (*Testing of Seeds Order*, 1918).

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Food of Wild Birds.

MUCH has been written on the somewhat vexed question as to whether certain wild birds are useful or harmful to agriculture and horticulture. It may be regarded as an undoubted fact that without very careful consideration and investigation of the food taken by any particular species, no trustworthy reply can be given to the question "Is this bird useful to agriculture?" A number of reports which have been published in recent years, though they may not be absolutely conclusive, may be held to give a very fair indication in the case of certain species. The report by Dr. Collinge published in this issue (see p. 668) deals with the food of the Missel Thrush, House Sparrow, Rook,

Skylark, Green Woodpecker, Sparrow Hawk, Kestrel, Wood Pigeon, and Lapwing. Of these Dr. Collinge concludes that the House Sparrow and Wood Pigeon are distinctly injurious, that the Rook and the Sparrow Hawk are injurious because too numerous, that the Missel Thrush is locally too numerous, and that the Skylark, Green Woodpecker, Kestrel and Lapwing are highly beneficial. The opinion expressed by Dr. Collinge that an investigation into the food habits of all the commoner species of wild birds is required, might well be supported by all lovers of birds, as no species should be generally condemned as harmful unless a thorough investigation has been undertaken.

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Women's Work on the Land.

IT may truly be said that work on many farms would probably have come to a standstill had it not been for the labour of either skilled or unskilled women workers. The demand for women for all kinds of agricultural work, from threshing and potato lifting to milking and calf rearing, is larger than the number of women available, for farmers now recognise more clearly than a year ago the ability with which women can undertake certain forms of farm labour. Many notes have been published from time to time in this *Journal* (see also p. 716) dealing with the excellent work which the land women have done, including that large body of local women workers who have possibly not yet been enrolled in one of the recognised women's organisations. It is hoped that the next issue of this *Journal* will be largely devoted to a consideration of women's work in agriculture and horticulture, the majority of the articles being written by women who are devoting themselves to recruiting, organising and training women for the land.

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Seed Wheat and Early Sowing.

IN view of the advantages which accrue from early sowing of wheat in a normal season, it is suggested that wherever the harvest operations will permit, wheat should be sown as early as possible. Late sowing appears to be frequently responsible for light crops. When seed is sown early the quantity sown per acre should be smaller; for example, 1½ bush. per acre sown in September are likely to give as good a crop as 2 bush. sown in October or 2½ bush. sown in November. The attention of farmers is specially directed to the note which appears at p. 717 and to the statement in the advertisement

columns, which refer to the high grade seed wheat which may be obtained through the scheme of the Food Production Department.

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Thatching.

A MATTER which needs the attention of farmers immediately on the harvesting of the corn crops is that of the thatching of ricks. It is felt that this year it may be difficult for many farmers to ensure the thatching of their stacks in the usual way by fairly skilled thatchers, while the ordinary method of thatching is recognised by efficient farmers as being wasteful even if well done. Further, inefficient thatching and the consequent results due to the wetting of the ricks account for the loss of very large quantities of grain annually. A method proposed by Mr. John Hepburn, Southchurch, Essex, which he claims can be carried out effectively by comparatively unskilled labour, is therefore worth attention. In place of a straw thatch, Mr. Hepburn proposes the use of corrugated iron, Willesden board or weather-proof sheeting as a cover for the stacks, the materials used being held together by laths passing along it lengthwise. Stacks should be lean-to in shape, and built upon slabs of wood, each with an eyebolt, to which can be attached by means of a cord the laths which are used for keeping the roof in position. To the cord may be attached weights which serve to adjust the roof as the stack settles. The " fall " in the lean-to will vary naturally with the size of the stack. Mr. Hepburn has evidence that in very exposed country and very severe weather his method has proved thoroughly effective.

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The Manure Heap.

THERE has never been a time when it was not desirable to take the very greatest care that there was no wastage of manure on the farm. This is particularly important at the present time, and for two reasons—(1) that all manure saved and applied to the land represents an increase in crop production, and (2) that there is a shortage of artificials. Farmers may very usefully take note of the suggestions on this subject which appear at p. 705.

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Tractors and the Harvest.

THE Food Production Department recently referred to the fact that the most striking feature of the in-gathering of this year's harvest has been the general employment of the tractors, in conjunction with the reaper and binder. Apart from

any question of intrinsic cost there is no doubt that the work of the tractors in the harvest field has been invaluable, as it was earlier in ploughing grass land, in cultivating and other work. Special organisations for assisting farmers have been set up by the County Executive Committees, and the reports show that the work done by tractors in the harvest fields has been keenly appreciated. The Food Production Department state that in Somerset tractors cut nearly 1,000 acres of corn in a week, and in Nottinghamshire 760 acres. Once corn is ripe it can quickly be cut with the aid of tractors and safely placed in stook to dry before carting, the speed of tractor work being much greater than that of horse labour. Farmers will have long since recognised that in all branches of farm work the tractor has come to stay.

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The Village Clubs Association.

AN amelioration of the conditions governing English village life has long been desirable, and, indeed, essential, if a plentiful healthy rural population is to be retained for agriculture. The workers of to-day look for something better than they have had—the land and all it means attracts them just as ever, but they need a wider mental horizon, communion with the world through books and the Press, more of the amenities of life, reasonable recreation, social intercourse, new ideas from mixing more freely with their fellow men and women, absence of patronage, a building up from below. In order to bring about something of this kind, to foster and set working the spirit implied, there has been formed the Village Clubs Association, the objects of which are to promote the establishment in rural villages throughout England and Wales of clubs founded upon the principles noted above, and to affiliate the clubs into one great organisation.

The Chairman of the Village Clubs Association is Sir Henry Rew, K.C.B., the Honorary Treasurers are Sir Charles Bathurst, K.B.E., M.P., and Mr. R. Holland Martin, C.B.; the Honorary Secretaries are Mr. A. Goddard, C.B.E. and Mr. George Dallas; and among the members are the Rt. Hon. R. E. Prothero, M.V.O., M.P. (*President of the Board of Agriculture and Fisheries*), Lord Clinton (*Joint Parliamentary Secretary of the Board of Agriculture and Fisheries*), and Sir A. D. Hall, K.C.B. (*Secretary of the Board of Agriculture and Fisheries*). The Committee appeal to all who are in sympathy with their objects to join the Association, and ask for subscriptions or donations,

which may be sent to the Treasurers at Martin's Bank, Lombard Street, London, E.C.

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Fruit Growing.

IN the *Journal* for August (p. 589) appeared an official Notice dealing with the desirability of increasing the area under strawberries up to the acreage for 1914. Supplies of fruit are always of the utmost importance, and with the present difficulty of importing fruit this year's failure of the fruit crops brings home to us very clearly the need for paying very special attention to home-grown supplies, and of increasing production as much as possible. In this connection correct and sufficient pruning, spraying, etc., are of very great value in ensuring a maximum production. Readers of this *Journal* will find many notes of interest touching on this subject (see also p. 706) while leaflets on fruit growing and fruit tree pests may be obtained free on application to the Board at 3, St. James's Square, London, S.W. 1.

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Collection of Acorns.

ATTENTION is again directed to the desirability of collecting the maximum quantity of acorns as a food for stock, as they will serve to eke out short supplies of other feeding stuffs. An account of the food value of acorns as well as of beechmast is given in the Board's Leaflet No. 291, a copy of which may be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1, post free. A full account of the food value of acorns, horse chestnuts and beechmast was given in this *Journal* for September, 1914, and notes giving instances of the feeding of acorns to live stock were published in October, 1915, p. 686, and December, 1917, p. 986.

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Official Notices and Circulars.

A SECTION of this *Journal* which should be particularly useful to agriculturists, especially at the present time, is that including the various Notices, Circulars, and Orders (see p. 718), which should be valuable for the purpose of easy reference. Farmers should take particular note of matters which directly affect their interests, and should consult their County Executive Committee when in doubt as to their position. Difficulties which are not met by the Committee should be taken to the Food Production Department of the Board (72, Victoria Street, London, S.W. 1.).

BEEF PRODUCTION.*

K. J. J. MACKENZIE, M.A., and F. H. A. MARSHALL, Sc.D.
School of Agriculture, Cambridge.

INTRODUCTION.

OUR purpose in this article is to state in brief and summarised form the main conclusions we have arrived at as a result of an extended investigation upon beef production in this country. The problems, the solution of which we set out to obtain, arose primarily out of the War, and they relate to the most economical condition at which cattle should be slaughtered and the best means by which that condition can be ascertained.

Our results are of the most far-reaching character, and we are of opinion that they involve a considerable revision of agricultural practice in the matters to which they relate.

It is self-evident that in present circumstances it is vitally necessary for us, as a nation, to make the best use of our capacity to produce food. Moreover, of the food substances which enter into the diet of a normal man in a temperate climate, meat is usually one of the most important. This may be partly the result of habit, but it is indisputable that under conditions of abundant food supply those animals which subsist on a carnivorous diet are, physiologically speaking, at an advantage over herbivorous ones. Thus the dog, which feeds mainly upon flesh and converts it into flesh, is able to dispense with the gigantic alimentary compartments which are characteristic of the herbivorous horse, ox, or rabbit wherein the energy used in digestion is correspondingly large. Again, a dog can subsist on a restricted diet of lean meat so that all of it is absorbed, whereas the horse and ox, which are adapted for an herbivorous diet, pass daily an enormous quantity of fœces or undigested residue. In man roomy alimentary compartments do not exist, and a diet containing a moderate quantity of meat is an advantage, since its normal effect is to decrease the labour of digestion and to reduce the fœcal residue. The desirability, therefore, of maintaining our home-grown meat supply is a matter of the greatest national importance, from the point of view of keeping up the strength of our people and preserving in full measure their morale.

With a view to determine the most economic time for slaughter and how far the market judgment of a beast

* Résumé of a Report presented to the Board of Agriculture and Fisheries in April, 1918, by the Authors. The full Report will be printed later.

coincides with its actual yield of meat and fat, we collected, from week to week, a number of animals of different degrees of "ripeness" and weighed and slaughtered them under conditions of exact observation.

A detailed Report of our work was presented to the Board in April, 1918. The subject is divided below into four sections:—

(1) Edibility.
(2) The Most Profitable Condition.
(3) Judging Beef Beasts.
(4) Beeflings or Baby Beef.

The total number of beasts dealt with was 92. With one exception they were all steers. They included:—

18 Shorthorn Beeflings.
3 Lincoln Red.
1 Half-bred Dutch.
30 Shorthorns showing 2 or more broad teeth.
2 Sussex.
4 Devon.
6 Hereford.
3 Aberdeen Angus.
2 Galloway.
6 Blue Grey.
4 Welsh.
5 Red Poll and Red Poll Crosses
1 Shorthorn Heifer.

In the case of the beeflings we had the additional advantage of being acquainted with their complete life history and the way they had been fed, since they were born and reared either on the Cambridge University Farm or at the Lord Wandsworth Institution (Long Sutton, Hants), of which one of us (K. J. J. M.) is Agricultural Adviser and was, during most of the life of these animals, acting as Director of the Farm.

In an Interim Report* we gave instances of the chaotic state of knowledge and the remarkable faultiness of judgment shown by the trade. It is needless to emphasise further this part of the subject for the results of the weighings of carcasses, obtained from animals handed over to unfortunate butchers under the grading system now in vogue, are only too evident testimony from all over England of the truth of the remarks we made about the general ignorance prevailing *when judgment had to be applied to the individual beast.*

It would be strange if it were otherwise, for in this country, beyond recording the prizes won at shows and the prices given for the winners, chiefly by foreign buyers, systematic work with beef-cattle has been confined, except as regards feeding trials, within almost negligible limits. It has consisted chiefly of recording a few weights and carcass percentages at the leading fat-stock shows. We ourselves

* Presented to the Board in August, 1917.

have for many years called in vain for opportunity to carry on such work, and yet two years and a half after the War began we had to start this inquiry without any of the equipment that is to be found in every agricultural establishment of repute in North America and in most of those on the Continent.

PROCEDURE.

Before dealing with the conclusions arrived at it will be well to give a brief account of our customary procedure.

Excepting for the beeflings referred to above and certain other steers which were obtained locally, the cattle were bought in the principal British markets, which were visited either by one (K. J. J. M.) or both of us. It was usually our purpose to obtain typical examples of the various breeds and types in the markets where they are best represented, and accordingly we attended public auction sales at Norwich, Cambridge, Newmarket, Leicester, Exeter, Shrewsbury, Wellington (Salop), Carlisle, Edinburgh, Perth and Dublin, other markets being also visited. Whenever possible we bought animals likely to afford suitable contrasts in regard to the degree of " ripeness " and, as we thought during the first stages of our inquiry, in regard also to percentage yield. In a few further cases steers were obtained for us by local agents in whom we felt confidence as having an expert knowledge of the beasts we required. Whenever possible a record of the beast's previous life history and the way in which it had been fed was procured from the original owner, and points of special interest were duly noted.

The beasts after being bought were conveyed to the University Farm, and were subsequently examined by one of us (K. J. J. M.) point by point. As a result of the examination the yield percentage (carcass to live-weight) was estimated. The following is a list of the points examined :—

(1) Neck vein.
(2) Chest and bosom or brisket.
(3) Chine or over shoulder.
(4) Shoulder blade and point.
(5) Crops or behind shoulder or over heart.
(6) Behind elbow.
(7) Lower rib., *i.e.*, floating or wing rib.
(8) Loin.
(9) Flank.
(10) Hook.
(11) Rump.
(12) Pin or aitch-bone.
(13) Buttock.
(14) Round or twist.
(15) Cod or scrotum.
(16) Thick flank.

At the time of the examination other matters of interest or importance were recorded, *e.g.*, the state of the hide, the age as determined by the teeth, and the general condition of the animal.

The live-weight of each beast, both unfasted and fasted, was ascertained. In the case of our second series of animals (Nos. 50 to 92 in our Report) great care was taken that the beasts should be fasted for as near as possible 24 hours (the exact time being put on record) before ascertaining their fasted weight, but in the first series (Nos. 1 to 49) the time of fasting was sometimes rather varied. It was found that the difference between fasted and unfasted live-weights might be as much as 12 per cent. and was frequently 7 per cent., the average with our second series being 6·66, whereas Lawes assumed this loss to be usually about 5·5 per cent.

The beasts were slaughtered on the premises of a local firm of butchers,* and one, or more frequently both of us, were present. Observations were made on the amount of internal fat, and on the condition of some of the more important organs, and any other matter of interest was noted.

One of us (F. H. A. M.) was present also when the "sides" of each beast were cut up in the butcher's shop. Joints were taken from each animal (with a few exceptions), these being the 7th or middle rib and the 13th or wing rib (together with the first cut of loin). These were cut in as nearly as possible the same way and always by the same man, in each case, so as to make accurate comparisons between the different animals. Various measurements were made upon each joint so as to supply data as to the degrees of development of certain muscles and the relative amounts of lean and fat present. In the wing rib and first cut of loin the depth of flesh was also measured. The 7th rib was then submitted to analysis, the amounts of bone, cartilage, lean and fat being weighed and recorded. The central portion of the iliospinalis muscle (which extends from the neck back to the hindquarters, often called the "eye" of the joint by butchers) was carefully dissected out from the surrounding fascia and interstitial fat, the substance of the muscle was dried, and the intermuscular fat extracted. A portion of the same muscle from the wing rib and first cut of loin was treated similarly. It must be realised that the proportion of fat found represents the degree of marbling occurring in the muscular tissue. This was greater in the portion of *iliospinalis* in the 7th rib than in the meat taken from the same muscle in the region of the wing rib and loin.

The condition found in each "point," and the measurements

* We have to thank Messrs. Warrington, of Cambridge, for putting their slaughter-house and men at our disposal; without this accommodation it would have been impossible to carry out our inquiry.

of the joints, together with other data, are recorded for every individual animal in the Report in the hands of the Board. The records and measurements afford a useful "check" to the analyses, supplying, as they do, information upon the amounts of fat not only on the outside of the *trapezius* and the *latissimus dorsi* muscles, but also the interstitial fat which lay between the muscles and on the inner side of the ribs.

Joints from certain of the animals were subjected further to cooking trials and edibility tests. These were undertaken at the Cooking School of the King's College for Women under the direction of Dr. J. E. Lane-Claypon, and at the Munitions' Hostel at Dartford, where, through the kindness of Mr. Hudson and with the help of Mr. R. H. Glasspool, we were able to carry them out ourselves, assisted by the very efficient staff at the Hostel.

EDIBILITY.

In the reports on the results of the cooking trials undertaken at the King's College for Women it is shown that there was little discrimination between beasts of varying percentages as far as edibility and suitability for cooking and carving were concerned. Thus a beast of 51 per cent.* was favourably commented on, no distinction being drawn between it and another beast of 56 per cent. Again, the briskets of three beasts of 58·5 per cent., 57 per cent. and 54 per cent. were uniformly described in the report received from Dr. Lane-Claypon as "extremely good both as to flavour and general facility for carving." It should, however, be added that there was some evidence that where joints from beasts of low percentages were favourably commented on, these were ones with a proportion of fat which was high for their position as regards yield percentage, for, as will be shown later, the fat proportion and the yield percentage of a beast are not correlated in the way hitherto supposed.

The object of the inquiry undertaken by ourselves at Messrs. Vickers' Munition Workers' Hostel at Dartford was to ascertain precisely what proportion of the carcass from different beasts was actually consumed, and what was left as dripping, as bone, and as waste on the plates. As in our analytical work, we selected a particular joint as an indicator, and this joint consisted of the 8th and 9th (and in two cases also the 10th) ribs.

In the first trial two joints were compared, and about their appearance the expert staff of the famous catering department were in no doubt. One was pronounced to be first-class quality and the other to be inferior. Yet the results showed that the

* Percentages calculated on fasted live weight.

percentage of meat actually eaten was greater for the inferior joint, and notwithstanding that there was a larger percentage of scraps left on the plates used to serve the meat than was the case with the joint from the fatter animal. The scraps from the leaner bullock were chiefly composed of gristle, which yielded no dripping, whereas the plates used for the other brought back over 60 per cent. of fat, which was melted down into good, firm dripping.

In the second trial joints from three beasts were compared. Two were said to be entirely satisfactory in appearance. The third was pronounced to be very inferior; the extreme disapproval was, however, mitigated when the joint came out of the oven, and disappeared altogether on its being carved. The percentage of meat eaten from the "inferior" joint proved to be actually higher than that from one of the other two, and only very slightly less than the percentage eaten of the third joint.

The third trial is of special interest because it included two beasts the joints from which gave respectively the highest and the lowest efficiency yield as expressed by the percentage of meat actually eaten. The joint of highest efficiency was from an animal whose fat proportion (as indicated by the analysis of the 7th rib) was 27 per cent., which is very nearly the highest proportion of fat which can be obtained without a fall in the yield percentage (see below).

The trials included two beeflings, the joints from which were favourably commented on, and there can be no doubt that the slightly less degree of marbling sometimes found in baby beef animals of a given degree of fatness is compensated for by the increased succulence of this young meat.

The two series of trials demonstrate clearly that meat obtained from beasts of comparatively low percentage can be satisfactorily cooked, served and eaten (and without giving rise to any complaints) and with a minimal quantity of waste. In the case of young animals which are moderately well bred the meat from a carcass even as low as 51 per cent. can be eaten by the public without hardship, but it is no doubt easier to spoil a bad joint in the cooking than it is to spoil a good one.

THE MOST PROFITABLE CONDITION.

For the purpose of comparing the conditions of the various beasts we decided to analyse one joint from a large number of animals in preference to attempting an analysis of a few whole carcasses or large parts of carcasses. As already stated, the

joint we selected was the 7th rib, which by reason of its position in the body and on account of its containing cartilage, bone, lean and fat in well-marked proportions, we took as an indicator or sample of the carcass as a whole.

In the table which follows the beasts are divided into four groups according to their percentages (carcass to live-weight): (1) under 53 per cent.; (2) 53 per cent. or over, but under 55 per cent.; (3) 55 per cent. or over, but under 57 per cent.; and (4) 57 per cent. or over; and the average composition of the 7th rib is given for the animals in each of the four groups.

Table showing Average Composition of "7th Rib" in Beasts of Different Percentages.

	Under 53 per cent.	*53 per cent. or over, but under 55 per cent.*	*55 per cent. or over, but under 57 per cent.*	*57 per cent. or over.*
Cartilage	3·7	3·3	2·6	2·4
Bone	18·4	17·3	16·9	16·0
Fat	15·5	18·4	21·5	24·4
Lean	62·1	60·6	58·4	56·9
	99·7	99·6	99·4	99·7

N.B.—Intermuscular fat (*i.e.*, marbling) is included in the lean in the above-given analysis—that is to say, it had not been separated out.

Each group contained about 20 beasts. It will be seen that there is, *on the average*, a certain correlation between the percentage of the animals and the amounts of bone, cartilage, lean and gross fat (*i.e.*, not including intermuscular or "marbled" fat) when the animals are divided in this way.

There was, however, a large amount of variation within the limits of each group. The difference may be due partly to age, breed and environment, but it is evident that there were wide individual differences which are difficult to interpret. This is shown in the next table, in which the beasts are arranged in the order of their fat percentage and are divided into four groups corresponding approximately but not exactly to the four groups in the preceding table. Here the yield percentage (carcass

to live-weight) of each individual is set out, and the average yield percentage for each proportion of fat is also appended.

Table showing Correlation between Percentages of Fat and Percentage of Yield.

Proportion of Fat.	Percentages of Yield of Individual Beasts.	Average Percentage of Yield.	Variation in each Group.
9	51	51	
10	—	—	
11	51, 53, 51	52	
12	—	—	
13	56, 55	55	50 to 58
14	54, 53, 53	53	
15	53, 52, 52, 53, 53, 54, 55, 50, 56	53	
16	55, 54	54	
17	54, 56, 51, 54, 58, 57, 53	55	
18	55, 54, 52, 55, 57, 54, 53, 55	55	
19	54, 58, 54, 52, 54, 53, 54, 51	54	51 to 58
20	56, 55, 56, 55, 57, 57, 53, 55, 53	55	
21	54, 56, 55, 54, 54	54	
22	60, 56	58	53 to 60
23	53, 54, 55, 56	54	
24	60, 56, 58, 58, 56, 53	57	
25	59, 58	58	
26	56, 55	55	
27	61, 58, 57, 58, 58	58	
28	62	62	
29	—	—	53 to 62
30	57	57	
31	60, 56, 56	57	
32	—	—	
33	56	56	

It is seen, for example, that beasts with a yield percentage (carcass to fasted live-weight) of 56 may have a fat proportion of as low as 15 per cent. or as high as 33 per cent. It is also shown that the beast with the highest yield percentage had a fat proportion of only 28 per cent., and that all those with a greater amount of fat were beasts of lower yield percentage; in other words, that after a certain point is reached (namely, 28 per cent.), the increase in the internal fat (that is, the fat attached to the intestines, and mesenteries and other "offal") reduces the yield percentage.

In the tables* constructed by the late Sir J. B. Lawes for estimating dead-weight from live-weight it is assumed that

* "Tables for estimating dead-weight and value of cattle from live-weight." Published for the Authors by the Royal Agricultural Society of England.

there is a direct correspondence between the yield percentage and the proportion of fat. The beasts are divided into five groups as follows :—

	Per cent.
(1) Stores	50–51
(2) Fresh Stores	52–53
(3) Moderately fat	54–57
(4) Fat	58–62
(5) Very fat..	63–65

Our results show clearly that not only is this correspondence very inexact for beasts in any condition of fatness, but that for fat and very fat cattle it is directly contrary to fact.

Further, the proportion of fat present, as indicated by an analysis of the 7th rib, is very often in closer correspondence with the *estimated* yield percentage (carcass to live-weight) than with the actual percentage. Thus in 10 beasts having an error of plus 2 or over in the estimated percentage, 8 proved on analysis to belong to groups having a higher percentage of fat than that indicated by their actual percentage. Conversely, of 17 beasts having an error of minus 2 or more in the estimated percentage, 10 proved on analysis to belong to groups having a lower proportion of fat than that indicated by their actual percentages. It is noteworthy that the exceptions in both cases (that is, 2 in the first case and 7 in the second) all belonged to groups which their percentages indicated—that is to say, it *never happened* that a beast with an under-estimated percentage was found on analysis to have a *higher* proportion of fat than that indicated by its actual percentage, nor did an *over*-estimated beast ever have a *less* amount of fat than that indicated by its real percentage. This matter is referred to again below in the section on Judging Beef Beasts.

No attempt was made to draw conclusions as to the percentage composition of different breeds, since the amount of individual variation was found to be too great to warrant the deduction of definite results from the limited number of beasts dealt with, though we did find one breed which seemed particularly easy to over-estimate.

The next table shows the percentage of fat found in samples of the iliospinalis muscle taken from the 7th rib and the 13th or wing rib. These analyses show the amount of " marbling " present in the meat. This condition is often taken when present as an indicator of good, or when absent as an indicator of bad, quality in the carcass. The beasts are arranged in the same four groups as in the first table.

TABLE SHOWING PERCENTAGE OF FAT (*i.e.*, "MARBLING") IN PORTIONS OF ILIOSPINALIS MUSCLE TAKEN FROM 7TH RIB AND WING RIB RESPECTIVELY.

Under 53 *per cent.*		53 *per cent. or over, but under* 55 *per cent.*	
7th rib	11·8	7th rib...	12·9
Wing rib	6·4	Wing rib	8·6
55 *per cent. or over, but under* 57 *per cent.*		57 *per cent. or over.*	
7th rib	17·3	7th rib..	20·4
Wing rib	12·5	Wing rib	13·9

It will be seen that in both ribs the fat in the second group does not greatly exceed that in the first group, but that in passing to the third group there is a considerable rise (4·4 per cent. and 3·9 per cent.) in the fat proportion in the two ribs. In the final group the fat in the 7th rib has increased a further 3 per cent. and that in the wing rib 1·4 per cent. There was, however, much individual variation, the relation between the marbling and the gross fat being sometimes widely different in individuals of the same or similar degrees of fatness.

In view of the importance attached to marbling, the presence of which is generally recognised as adding to the value of meat from every point of view, these results point to beasts having an average yield percentage of 55 to 56, an average gross fat proportion of about 21 to 23 per cent., and the average amount of marbled fat in the 7th rib at about 17 or 18 per cent., as the most useful and profitable in any conditions approaching normality. *In present conditions steers might well be slaughtered when still less fat. One has to see the amount of waste fat on the intestines and hide to realise the full extravagance of feeding excessively, and this state of affairs we witnessed in the case of grass-fed animals, and very frequently, indeed, with beasts caked on the grass or finished in yards. These observations, and our own ascertained data, confirm the conclusion indicated by the result of all feeding trials, namely, that the fatter an animal gets the less return he gives for his food. They are in complete agreement, further, with the established fact that the longer an animal lives the more food he requires to put on weight.* Both these factors have to be balanced with (1) the edibility of the carcass after slaughter and (2) the difficulty, trouble and expense of rearing the calf till weaned.*

* "Baby-Beef," by K. J. J. Mackenzie, *Journal of the Board of Agriculture*, Vol. XVII. (1910—11), p. 177.

JUDGING BEEF BEASTS.

Special Factors in the Determination of Yield Percentage.—In buying beef beasts it is obvious that total weight must always be the most considerable factor in determining the value of an animal, but owing to personal prejudice an undue importance is often assigned to weight in estimating a beast's yield percentage. Thus, good quarters play an important part in deciding live-weight, but there is no evidence that they contribute a greater share than the forequarters in determining the percentage. "Quality" is a source of deception as regards bone; the bony frame adds to the carcass weight just as does the flesh covering it, though the butcher does not want bone, and consequently looks upon the "strong" boned animal as of bad quality. Age has been much exaggerated as a factor in deciding the percentage, as our results show, for even beeflings may attain a yield of 58 per cent. The complete investigation shows, however, that out of 18 animals that had 5 or more broad teeth up (say. from 30 to 48 months old) only 1 yielded less than 54 per cent. The thickness of a beast's hide seems to have little practical effect on its percentage Loss on fasting may play an important part in estimating. In 40 beasts with which we exercised special care in this matter the loss varied from 3 to 9·09 per cent., the highest actual loss being 112 lb. and the lowest 21 lb. The average loss for the 40 beasts was 6·66 per cent. The 20 beasts giving the highest percentage had an average loss of 6·21 per cent. and the 20 lowest an average loss of 7·12 per cent. on fasting.

We may now consider briefly the various points judged. A list of these points has been given above (p. 625). They may be grouped into (1) those governing the width of the beast's frame and quarter, (2) those governing the covering of the "neck vein" and "frame" (*i.e.*, all points in front of the "hooks"), and (3) those governing the covering of the quarter (including the flank).

(1) Our figures show clearly that very great stress should be laid upon the value of width in estimating the probable percentage of carcass to live-weight. This is seen especially when considering the bosom or brisket (point 2) and the chine (point 3).

(2) Of the points governing the covering of the frame (or the parts of the body in front of the quarter) the neck vein (point 1) is of great value in estimating the percentage. Of the other points the crops (point 5), the lower or wing-rib (point 7) and the loin (point 8) are

very useful indicators. With regard to the effect of age on the covering of the frame it was found that the neck vein, the chine, the wing rib and the loin were of comparatively little value in estimating yearling cattle. The point (No. 6) "behind the elbow" or the butcher's "thin flank" differed from the others in that all the animals receiving the highest praise for covering were those showing two broad teeth.

(3) Of the points governing the covering of the quarter, including the flank, our figures show that the hook (point 10), the pin or aitch-bone (point 12) and the *depth* of the buttock (point 13) are of considerable value as indicators. The round or twist (point 14) and the thick flank (point 16) are comparatively worthless. The flank (point 9) has a very high value set upon it by the practical man, but our results supply little evidence in support of this claim, though heaviness of flank seems to be a better indicator than thickness. The rump (point 11) does not seem to afford any great help to the estimator, notwithstanding that judges at fat stock shows pay great attention to this point. The cod or scrotum is of little value, and we have formed the opinion that the mode of castration affects the later development of this point. With regard to the effect of age upon these points it would appear that the rump, the hook, and the pin bone are all better indicators with older animals than with yearling cattle. Moreover, in the case of yearlings, thickness of flank is more important than heaviness.

Condition of Fatness.—It has been pointed out above in the section on "The Most Profitable Condition" that over-valuing of the state of fatness as a means of appraising yield percentage has been one of the main causes of inaccuracy in estimating. The results of this error may now be considered in relation to the present national necessity.

The public just now has need of every useful animal, *i.e.*, one that gives a good yield of carcass with enough fat. The error tends to leave a very large proportion of our cattle feeding too long because the estimator believes them to be low in yield of carcass, since the percentage of fat is only normal or "useful." He is, in other words, *waiting* till *he feels fat* on the animal, which will most likely produce a high percentage of dripping but *need not* necessarily give the nation a large amount

of useful meat. **The nation cannot afford to wait**; it wants all the cattle that are useful *immediately* they are ready and yield weight enough: to keep them longer is to use up food that is badly wanted for other purposes or to encumber land that should be under the plough or growing hay, much wanted for the winter's keep.

How far the error just referred to can be carried is well shown by two bullocks (Nos. 73 and 80 in the main Report). The former was an 8-tooth animal (2 only just through) that one of the first graziers in Leicestershire was just about to offer as "*prime*." We estimated it at 60 per cent. ("Fat" in Lawes' Tables). The latter, No. 80, was a beast off the University Farm which we kept back three months because we did not think it good enough to go with companions slaughtered at 15–16 months old. No. 73 was finished on the *best bullock land* in Leicestershire. No. 80 had a small amount of cake (3·5 lb.), to help out somewhat poor grass, from June to October. We slaughtered it then, much against advice given by good practical men for the *experiment*. We only estimated it at 53 per cent. (by Lawes' Tables "Fresh Store"), but it yielded over 56 per cent. The Edibility Tables show that only 47·7 per cent. of the joint from No. 73 and 48·8 per cent. of No. 80 was eaten up readily.

(*No.* 73.)		(*No.* 80.)	
Ascertained carcass percentage	56.2	Ascertained carcass percentage	56.02
Fat in joint percentage..	33.75'	Fat in joint percentage..	15.68
Carcass weight in stones (14 lb.)	56.2	Carcass weight in stones (14 lb.)	39.0
Age about 42 months ..	—	Age 18 months 24 days	—
	stone weight.		*stone weight.*
Carcass weight put on per month of life	1.34	Carcass weight put on per month	2.05
Calculated fat per month	.452	Calculated fat per month	.322

From the above figures we see that while waiting for an animal to become what we have been taught to look upon as "prime" we have allowed a *total loss* of 9 lb. of good meat every month of one animal's life so as to get part of his carcass as very fat meat and the rest as dripping. ***This, of course, is an extreme case, but the whole tendency of the misconception lies in this direction.***

In the same way the misconception above referred to may lead to over-feeding. Through the courtesy and the large-minded policy of the Trustees of the Lord Wandsworth Institution, who wished to help the inquiry from the resources of the

Trust, we are able to demonstrate the truth of our contention. The Trustees put at our disposal the joints from 12 beefling steers, the history of which we know. The four beasts (Nos. 33, 34, 51, 53, in our main Report) were all treated in the same way, as the results here set out:—

No. of Beef Beast.	Actual Carcass Weight.	Estimated Carcass Weight.	Percentage of Fat.	Age.	Milk Ration Fed to Calf.
	Per cent.	Per cent.			
53	53·88	51·0	15·08	13½ months	*10 gal. milk.
51	54·8	53·5	—	13 ,,	50 ,,
33	53·0	54·5	23·94	12 ,,	50 ,,
34	55·85	56·0	20·28	13 ,,	160 ,,
Average	54·882	53·75	19·76†	12·875	67·5

* Except that the amount of milk, when reduced, was replaced by calf meal substitute, the steers were all fed in the same way.

† Average of 3; 51 was not analysed for fat.

It will be noticed that the average carcass percentage is 54·88 and the average fat percentage is 19·76.

Believing that we should increase the carcass yield, we decided to imitate the local practice with beeflings and have them forced at the end of their feeding time. The feeder was, therefore, instructed to " finish " with all the cake and corn which was readily eaten. The result is set out as follows:—

No. of Beef Beast.	Actual Carcass Weight.	Estimated Carcass Weight.	Percentage of Fat.	Age.	Milk Ration Fed to Calf.
	Per cent.	Per cent.			
90	53·69	51·0	18·59	14 months	10 gal. milk.
87	53·3	52·5	24·37	15 ,,	50 ,,
86	53·2	54·5	20·03	15 ,,	50 ,,
91	51·78	53·0	10·84	14 ,,	160 ,,
Average	52·99	52·75	20·7	14·5	67·5

It will be noticed that with these forced beasts the carcass percentage is *down* and the fat percentage is up. The number of comparable animals is, of course, small, but it must be admitted that the figures are at least strongly suggestive.

It might appear unbelievable that such a misconception as that above alluded to in regard to fatness as a guide to percentage yield could be universal, but there are explanations. To begin with, it had behind it the authority of Sir J. B. Lawes, whose name in *another department* of Agriculture is revered all over the civilised world for his investigations into

matters connected with manures and manuring. Further, the farmer seldom, in this country, weighs his cattle either dead or alive, and the butcher seldom weighs his both alive and dead. Furthermore, with an over-fat beast, though the yield in carcass is low, the butcher has the high yield of "apron" and "gut" fat, for which he pays nothing. It is the *waste* "gut" and other fat, and dripping, that costs the nation so dear. In the course of our investigation, though *not* with the animals we were working on, we saw some rough offal from a slaughter-house being prepared for pigs. The pig-boy was trimming off the fat and *throwing it on the dung heap* (at the end of *the 3rd year of War*), because he told us that in his opinion, with which we agreed, so much fat "*upsets the sows*." There remains the kitchen to consider. In this department the fat boiled off the pig-wash tells its own story, if the public care to learn from the eating-house keeper; as regards the private householder, it is well to remember that till the War came the dripping was often the perquisite of the cook.

We would once again urge the folly of allowing so much ignorance to prevail. But if the public desire enlightenment about economical methods of producing meat, such knowledge can only be obtained through investigators properly trained and equipped, and both man and material mean national cash expenditure. Our own inquiry was carried on as war-work; of equipment we had none, and our results were much more difficult to obtain in consequence.

BEEFLINGS OR BABY BEEF.

The work which we have carried through once again draws attention to the economic importance of bringing out quite young cattle as beef. Innumerable instances of its profitableness have been published in leading agricultural organs, the practice has had the support of many of our most prominent farming authorities throughout the past fifty years, and there is hardly a district where one, at least, of the leading farmers does not demonstrate its possibilities from time to time. With sheep and pigs our agriculturists, as a rule, take full advantage of the early maturity propensities of their herds; yet in this, the fourth year of the War, the number of beef-beasts ready to make useful meat between the ages of 10 and 14 months is so few that their very exceptional appearance only makes the neglect of their production wholesale the more obvious and regrettable. **The practice of growing good beefling meat should be specially encouraged just now,** for though producing much valuable food it demands no hard labour.

It does, on the other hand, cause considerably *more trouble*, but this trouble the women war-workers of the country are particularly well-suited to undertake.

We have extracted the following figures from the records* of the Lord Wandsworth Institution.

The first two animals we deal with, Nos. 51 and 53† (in our main Report), had never been forced, nor finished in the ordinary sense of the word, and gave the following results (the average of the two) :—

Milk, 48·5 gal. Concentrates, 1,070·5 lb. Hay, 2,419 lb. Roots, 5,237 lb. Chaff, 52 lb.	Yielded	673 lb. live-weight (including 92.5 lb. at birth). 376 lb. of meat.

Age 12·25 months.

So that to get 1 lb. of carcass or meat it took ·129 gal. of milk, 2·85 lb. of concentrates, 6·4 lb. of hay, and 14 lb. of roots and chaff.

The next two, Nos. 86 and 87‡, were forced at the end of their lives, so as to get them prime, with all the concentrates they would eat, and for the last six weeks they averaged 9 lb. per head a day. For them we get the following results :—

Milk, 47 gal. Concentrates, 1,649 lb. Hay, 3,142 lb. Roots, 4,209 lb. Chaff, 485 lb.	Yielded	Live-weight 721 lb. (including 91 lb. at birth). 384 lb. of meat.

Age 15 months.

It will take of milk ·122 gal., of concentrates 4·3 lb., of hay 8·2 lb., of roots 11 lb., and of chaff 1·26 lb. to make 1 lb. of carcass or meat.

A further example, obtained since the main Report was written, was forced from birth till it was killed at 10·5 months old. Our object was to obtain a very prime young beefling so as to ascertain if it was possible to get marbled meat with such baby beef. We may say that this small carcass caused universal admiration among many practical men, butchers and farmers, who inspected it alive and dead.

Milk, 105 gal. Concentrates, 1,496 lb. Hay, 1,096 lb. Roots, 5,432 lb. Chaff, 164 lb.	Yielded	Live-weight 672 lb. (including weight at birth). 374 lb. of meat.

Age 320 days.

* One of us (K. J. J. M.) with Miss McIlvray will publish these records in due course.

† See first table, p. 636. ‡ See second table, p. 636.

To make 1 lb. of meat in this case we use up of milk ·28 lb., of concentrates 4 lb., of hay 3 lb. (nearly), of roots 14·5 lb., and of chaff ·3 lb. (or nearly so).

This small bullock showed the following remarkable analysis :—

Bone	15.01
Cartilage	1.41
Fat	33.01
Lean	50.57

The marbling percentage amounted to 17·92 in the 7th rib and 9.37 in the 13th. Microscopic sections through the tissue showed a large quantity of intermuscular fat. Apart from the marbling, which is nevertheless adequate, the percentage of fat was as great as that found in the fattest prime bullock with 4 teeth up recorded in the main Report.

Seeing that it is common practice to take animals that *have already lived* till 30 months old and give them 1,120 lb. of concentrates, 720 lb. of hay, 720 lb. of chaff, and 15,680 lb. of roots during a period of 20 weeks fattening, during which time they will have increased, if they have done well, 280 lb. in live-weight, we think the above figures are eloquent. *It seems to us difficult to conceive that, once the significance of the figures we publish is realised, the beefling should go on being neglected in these days when economy in food-stuff for both man and beast forms a large part of the foundation of our future national existence.*

That it is ignorance which prevents the beefling from being more generally produced is self-evident to anyone who has seriously studied the problem of beef production ; an ignorance born of prejudice forced upon the cattle husbandmen during the last half-century, when he had to banish all thoughts of high production and seek a profit where and how he could.

We wish to express our obligations to all those who have helped us in carrying out the inquiry. To the Trustees of the Lord Wandsworth Institution we are indebted for placing at our disposal the joints from 12 beeflings. We wish to thank Messrs. Vickers, Mr. Hudson, and Mr. Glasspool for their kind help in enabling us to carry out the cooking and edibility trials. We are under obligations to Messrs. Warrington, of Cambridge, for the numerous facilities with which they provided us. We are indebted to Mr. A. J. Codling for the great care and labour which he bestowed upon analysing the meat. We have to thank Mr. J. Fleming, Assistant to the Reader in Agriculture, and Mr. A. J. Burgess, the Farm Steward, for their

valued help upon that part of the work which was done upon the University Farm. Many cattle-salesmen, farmers, butchers and dealers were most helpful to us when selecting the beasts by giving us the benefit of their opinion in regard to the weights and yields of the various animals. To all who assisted in this way we wish to express our thanks.

CONCLUSION.

(1) Our examinations and observations have shown that the existing knowledge of how to estimate carcass percentage in *any one live animal* is in a chaotic state and demands much further investigation.

(2) Out of this chaos there arises from our work one observation of very considerable importance. It has been held (as exemplified by Lawes' Tables) that certain degrees of fatness indicate certain proportions of carcass weight. When this rule is applied to individual animals it results in a person whose hand touches the animal putting a far too high value upon any feeling of fatness.

(3) This leads in practice at the present moment to far too many beasts being left unslaughtered until the most economic time for killing is passed and the beasts' usefulness has diminished.

(4) In view of the practice adopted at present in estimating cattle we can recommend that all young beasts judged to be fresh stores to moderately fat may, with advantage, be slaughtered to provide meat for the nation.

(5) Aged animals (showing 4 teeth) left till they are what is known as "prime" are likely to grow fat at an inordinate expense of meat.

(6) In growing beeflings or baby-beef, there is a great potential reserve of meat in this country.

THE OFFICIAL SEED TESTING STATION AT THE FOOD PRODUCTION DEPARTMENT OF THE BOARD.

FIRST ANNUAL REPORT.

The Seed Testing Station was opened by the President on 14th November, 1917. The seed testing year 1917–1918 ended on 31st July last, as it has been decided that the testing year shall date from 1st August to 31st July. During the season now ended (8½ months) 7,744 samples were received at the station; of these 5,676 were sent by 492 seedsmen, 1,553 by 772 farmers, landowners and allotment holders, 515 samples having been tested for the Board and other Public Departments.

The number of samples of the several species tested has been as follows:—

Wheat	206	Sunflower	6
Barley	348	Maize	24
Oats	1,370	Perennial Rye-grass	347
Rye	10	Italian Rye-grass	340
Peas	93	Cocksfoot	157
Beans	61	Timothy	151
Vetches	77	Meadow Fescue	77
Turnips	323	Crested Dog's Tail	56
Swedes	369	Other grasses	9
Rape	75	Yarrow	5
Kale	73	Chicory	7
Cabbage	108	Red Clover	1,249
Kohl rabi	9	Alsike (including mixtures of Alsike and White Clover)	392
Mustard	20		
Broccoli	15		
Mangolds	594	White Clover	313
Beet	52	Trefoil	294
Parsnips	24	Lucerne	78
Onions	145	Sainfoin	66
Carrots	44	Crimson Clover	38
Other vegetables	12	Other leguminous herbage plants	6
Linseed	92		
Hemp	1	Grass and clover mixtures	5
Buckwheat	3		

The distribution of samples through the seed-testing year is shown in the diagram on p. 643. It will be noted that the greatest pressure of work at the Station was from the end of December until the middle of March, the maximum number of samples (528) being received during the week ending 23rd February. The period in which the fewest samples were

received was from the middle of April until towards the end of July. The daily average of samples all through the season was 35.

That the seed trade have evinced considerable interest in the Station is shown by the fact that upwards of 70 representatives of the leading firms have visited it during the season.

A Preliminary Report on the quality of the seeds tested by 4th February last (2,400 samples) was published in the February number (Vol. 24, No. 11.) of this *Journal*; it is now proposed to give a detailed review of the results obtained on the total number of samples tested during the season. It is of interest to note that the present account deals with a far larger number of samples than have hitherto been reported upon in England and Wales. Biffen* in 1916, however, reported upon 676 samples collected by the Board during 1912, 1913 and 1914; Stapledon* reported in 1914 and 1916 on 1,239 samples collected in Central and South Wales during 1913, 1914, 1915 and 1916; Jenkin* reported upon 420 samples collected in North Wales during the period 1913-1915. A considerable amount of information is, therefore, available as to the quality of seeds put on the market during the last six years, and it is possible in certain cases to draw comparisons between the seeds used for the production of current crops and those sown during the immediately preceding years.

It will be convenient to give the chief results in tabular form for reference, and to give further particulars as to the several species separately. A summary of the main conclusions to be drawn is made at the end of the Report (p. 665.)

CEREALS.

(See Table I., p. 644.)

Wheat.—The Station opened too late in the season to deal with a representative number of samples of Autumn wheat. The average germination of all the wheat samples was 85·4 per cent., whilst that of the Spring wheats was 84·4 per cent. That the germination of the Spring wheats was less dependable

* *See* (*a*) Biffen, Professor R. H., M.A., F.R.S. Report on an Inquiry into the Quality of Farm Seeds, 1912-1914. This *Journal* Vol. XXII. February, 1916.

(*b*) Stapledon, R. G., M.A. Report on Seeds purchased in Central and South Wales. Seasons 1915-16. This *Journal*, Vol. XXIII. December, 1916.

(*c*) Report on the Condition of the Seed Trade in the Aberystwyth College Area. University College of Wales, Aberystwyth, Bulletin.

(*d*) Jenkin, T. J., B.Sc. Report on Seeds tested 1913-15. University College of North Wales, Bangor, Bulletin.

When these Reports are referred to in the body of the Report the name of the recorder only, *e.g.*, Biffen, Stapledon, or Jenkin, as the case may be, is given.

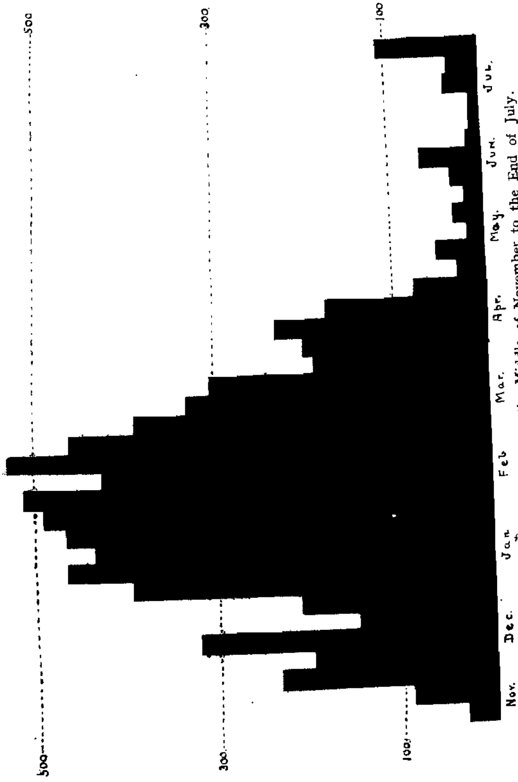

Chart showing Weekly Totals from the Middle of November to the End of July.
Maximum = 528. Average = 209. Minimum = 10.

than that of the Autumn varieties is, however, shown by the fact that 28·5 per cent. of the former samples germinated under 80 per cent., whilst not more than 20 per cent. of the Autumn varieties failed to reach a germination of 80 per cent. It is to be noted that the average germination of wheat was considerably less than that of barley or oats, and that the number of samples received with a germination of less than 80 per cent. was also greatest in the case of wheat, practically 6 per cent. of the samples actually germinating less than 50 per cent. Many of the poorest samples were sent by farmers who asked whether their grain was fit for sowing, so that it is reasonable to suppose that the adverse reports sent out by the Station on such samples prevented the bulks they represented being used for that purpose. Four per cent. of the samples were contaminated with "bunt" (*Tilletia tritici*). Two samples contained Ear Cockle (due to the eelworm *Tylenchus scandens*) and a large number of the poorer samples were badly sprouted. Several instances of the depressing influence of some of the proprietary seed dressings on germination were noted.

TABLE I.—*Showing the Percentage Germination of Cereals and Pulses.*

	Highest Percentage.	Lowest Percentage.	Average Percentage.	Percentage of Samples Germinating between			
				100–90 Per cent.	89–80 Per cent.	79–51 Per cent.	50–0 Per cent.
Wheat ..	100	10	85·4	65·6	10·9	17·6	5·9
Barley ..	100	10	89·4	71·0	13·8	12·5	2·7
Oats	100	20	89·5	65·3	25·7	8·1	·9
Rye	96	58	84·8	50·0	30·0	20·0	—
Peas	100	35	86·7	61·2	21·1	15·5	2·2
Beans ..	100	0	88·4	67·4	16·3	11·4	4·9
Vetches ..	99	4	77·6	40·9	25·0	21·0	13·1

Barley.*—The average germination of barley was practically the same as that of oats, but a larger number of high class samples of barley was received than of either oats or wheat. Most of the barley sent from the Midland and Eastern Counties was excellent; the germination of samples from Hants. Devon, Cornwall, and most of the Welsh counties was, however, decidedly poor, the great majority of samples with germinations of less than 75 per cent. coming from these districts. About 10 per cent. of the samples were badly contaminated with the spores of the "closed" smut (*Ustilago Hordei*) and a considerable number were badly sprouted.

* A portion of most of the barley samples has been sent to Mr. E. S. Salmon, of the South Eastern Agricultural College, Wye, for investigation in reference to "Smut" in barley.

Oats.—Since over 1,300 oat samples were tested, a sufficient number has been received for the averages from certain groups of counties to be compared. For this purposes only samples stated "as grown" in the various counties have been considered. The figures in brackets represent the number of samples averaged in each case. The averages are as follows:—

		Germination. Per cent.			Germination. Per cent.
Scotland	(74)	94·4	Somerset, Wilts and Dorset	(15)	89·0
Isle of Man	(64)	91·8	Wales	(90)	88·6
Northern Counties	(20)	91·5	Devon and Cornwall	(110)	86·5
Ireland	(29)	91·6	Kent, Surrey, Sussex and Hants	(40)	83·0
Midlands	(50)	90·2			

It is interesting to note that the southern and western counties gave the poorest germinations, and that these counties and Wales contributed the greatest number of samples with germination below 80 per cent. The Scotch oats not only gave the best average, but only 13 per cent. of these germinated less than 90 per cent. The average germination of black oats was one per cent. lower than that of other oats. A considerable number of samples, especially from Wales, Devon, Cornwall and some of the southern counties, showed evidence of having been heated in the stack, whilst an appreciable number were sprouted. A number of the oat samples contained varying proportions of shelled grain, and it was found that on an average the germination of shelled grain was 26 per cent. lower than that of the normal unshelled grain constituting the sample. It was also found that the shelled grain did not in many cases germinate normally.*

Rye.—The number of samples of rye tested was not sufficient for the results to be taken as representative, but, as might have been expected, the average germination proved to be lower than that of other cereals. One sample contained several ergots (*Claviceps purpurea*).

Purity in Cereals.—Several samples containing upwards of 1·5 per cent. of weed seeds were received. One sample of wheat contained 10 per cent. of weeds, mostly corncockle (*Lychnis Githago*), a sample of oats 8 per cent. of wild radish (*Raphanus Raphanistrum*), a sample of rye 1·8 per cent. of soft brome grass (*Bromus mollis* et spp.), and a sample of barley nearly 3 per cent. of knapweed (*Centaurea nigra*); it was, however, the exception for cereals to contain a high

*Further investigations are in progress, and this and other data collected in connection with the large number of oats tested will be reported upon subsequently.

percentage of impurity. The samples sent to the Station by farmers none the less indicate that enough attention is not paid to the purity of cereals for sowing. It should be realised that even ½ per cent. of weed seeds in cereals, sown as they are in terms of bushels to the acre, is sufficient to introduce a large number of weeds like charlock (*Brassica Sinapis*), docks (*Rumex* spp.), black bindweed (*Polygonum Convolvulus*), and soft brome (*Bromus mollis et* spp.) on to the land.*

The most commonly occurring weed seeds in cereals were in approximate order of their frequency as follows:—

- Black Bindweed (*Polygonum Convolvulus*).
- Charlock and Wild Turnip (*Brassica* spp.).
- Cleavers (*Galium Aparine*).
- Wild Radish (*Raphanus Raphanistrum*).
- Redshank (*Polygonum Persicaria et lapathifolium*).
- Fat Hen (*Chenopodium et Atriplex* spp.).
- Dock (*Rumex* spp.).
- Wild Vetches (*Vicia* spp.).
- Knapweed (*Centaurea nigra*).
- Campions (*Lychnis et Silene* spp.).
- Bindweed (*Convolvulus arvensis*).
- Corn Cockle (*Lychnis Githago*).
- Soft Brome (*Bromus mollis* et spp.).
- Creeping Thistle (*Cirsium arvense*).
- Knot-grass (*Polygonum aviculare*).
- Wild Oat (*Avena fatua*).
- Hemp Nettle (*Galeopsis tetrahit*).
- Field Foxtail (*Alopecurus myosuroides*).
- Darnel (*Lolium temulentum*) (chiefly in rye).
- Venus' Comb (*Scandix pecten*).
- Fool's Parsley (*Aethusa cynapium*).
- Poppy (*Papaver* spp.).
- Field Alkanet (*Lycopsis arvensis*).
- Sun Spurge (*Euphorbia helioscopia*).

The wheat and barley samples frequently contained appreciable amounts of broken seed, whilst wheat often contained much barley and some oats; barley and oats were moreover very general impurities in each other.

PULSES AND TARES.

(See Table I., p. 644.)

Peas.—The average germination of garden peas was 86 per cent., the highest germination being 100 per cent., and the lowest 35 per cent. The average for the 15 samples of field peas received was 87 per cent., with a highest germination of 100 per cent. and lowest of 42 per cent., whilst 17 per cent. of all the pea samples germinated under 80 per cent. Several of the field pea samples were badly sprouted, whilst a large

* See "The Quality of Agricultural Seeds," this *Journal*, Vol. XXIV., February, 1918, p. 1203.—"Purity in Cereals."

number of the garden samples consisted of old seed. Practically all the garden samples were pure except for small amounts of broken seed. Some of the field samples contained as much as 10 per cent. of broken seed; one of these samples contained a considerable amount of wild oat (*Avena fatua*), whilst the seeds of cereals were also common impurities in the field peas. Three per cent. of the pea samples were attacked by beetles (*Bruchus* spp.).

Beans.—The average germination and the range of germination (in brackets) for the various classes of beans tested was as follows:—

Field beans	97·1	per cent.	(100–80).
Broad beans	93·4	„	(100–48).
Scarlet runner beans	80·1	„	(98–48).
Dwarf French beans	62·7	„	(86–0).

The number of samples tested was not sufficient for the above figures to be taken as representative, but it is evident that scarlet runners and French beans in particular were of poor average quality. The bean samples were free from weed seeds, but frequently contained from ·5 per cent. to 2 per cent. of broken seeds, and about 7 per cent. of the samples were attacked by beetles (*Bruchus* spp.).

Tares or Vetches.—The quality of the vetch samples was decidedly poor, giving an average germination of only 77·6 per cent. with 13 per cent. of the samples germinating below 51 per cent.; several of the poorest samples were badly sprouted. The purity of vetch samples was also low, the average impurity amounting to 4·48 per cent. independent of rye, which frequently contributed over 10 per cent. to the samples. The chief impurity was broken seed, which, in some instances, amounted to 10 per cent. and in one case to as much as 17 per cent. The chief weed seeds present were:—

Cleavers (*Galium Aparine*) (in 32 per cent. of the samples), corn cockle (*Lychnis Githago*) (in 10 per cent. of the samples), darnel (*Lolium temulentum*), black bindweed (*Polygonum Convolvulus*), poppy (*Papaver* spp.), bindweed (*Convolvulus arvensis*), cornflower (*Centaurea Cyanus*), and corn crowfoot (*Ranunculus arvensis*). A few samples were attacked by beetles (*Bruchus* spp.).

ROOTS: CERTAIN FORAGE CROPS: CERTAIN VEGETABLES AND LINSEED.

(See Table II., p. 648.)

Mangolds.—The mangold seeds on the market were probably above the average of recent years, the average germination*

* The germinations of mangold and beet are expressed in terms of the number of seedlings developed per 100 seed clusters.

being 137·8 per cent. compared with 116·4 per cent. and 116·7 per cent. given by Biffen for 1912 and 1914 respectively.

A large number of poor samples with germination below 100 per cent. were, however, received at the Station.

In the main, as far as can be gathered from germination trials, the seeds were very true to type, and Biffen found the same to apply to the samples tested in 1912 and 1914. It is of interest to note that the majority of the mangold seeds were at least yearlings, thus showing that the seeds of this plant may improve rather than deteriorate by being kept for a year.

TABLE II.—*Showing the Percentage Germination of Root and Vegetable Crops.*

	Highest Per-centage.	Lowest Per-centage.	Average Per-centage.	Percentage of Samples Germinating between			
				100–90 *Per cent.*	89–80 *Per cent.*	79–51 *Per cent.*	50–0 *Per cent.*
Turnip ..	100	1	83·7	41·6	34·0	21·3	3·1
Swede ..	100	0	79·9	37·6	30·3	25·4	6·7
Rape	99	52	90·2	67·7	28·1	4·2	—
Kale	99	12	71·5	27·9	14·7	36·1	21·3
Cabbage ..	*96*	2	73·5	*16·8*	29·2	*42·6*	11·2
Parsnip ..	84	0	45·0	—	10·0	45·0	45·0
Onion ..	100	1	78·9	40·8	24·2	27·5	7·5
Carrot ..	94	6	62·8	2·3	23·3	57·1	23·3
Linseed ..	100	29	87·2	66·2	12·0	16·4	5·4
				Over 200 Per cent.	199–150 Per cent.	149–100 Per cent	99 Per cent.
Mangold ..	266	0	137·8	5·6	36·2	42·6	15·6
Garden Beet..	191	10	84·0	—	13·0	13·0	74·0
Sugar Beet ..	226	14	143·8	17·3	30·5	39·2	13·0

Sugar Beet.—Only a few samples were tested, these gave the satisfactory average germination of 143·8 per cent.

Turnip and Swede.—It is to be noted that the average germination of the turnip samples was decidedly higher than that of the swedes, but since the average figure for both was less than 85 per cent. the quality of these seeds was probably below the average of normal years. Over 20 per cent. of the samples of both germinated less than 80 per cent., eight samples being received with germinations of less than 10 per cent.

Several of the poorer samples of these and other crucifers were more or less badly sprouted.

Rape.—The average figure for rape (90·2 per cent.) was over 6 per cent. better than that of any of the other crucifers, and this, together with the fact that only 4 per cent. of the samples germinated below 80 per cent. and none under 50 per cent., suggests that the average quality of this seed was good.

Kale.—The majority of the kale samples were decidedly poor, 21 per cent. germinating less than 51 per cent., and the average being only 71·5 per cent.

Cabbage.—The average germination of the garden varieties of cabbage, including savoy, was 75 per cent., and the average germination of field cabbages 72 per cent. The quality of the cabbage samples was thus appreciably below that of the turnip and swede and a little better than the kale.

Parsnip.—Parsnip seed seldom reaches a high percentage of germination; the average figure, 45 per cent., was, however, lower than that reported by Jenkin (on comparatively few samples) in 1915. This seed undoubtedly needs to be purchased with great caution, for 4 out of the 21 samples received failed to germinate; 1 only reached 2 per cent. and another only 14 per cent.

Onion.—The average germination of the onion samples (78·9 per cent.) was decidedly satisfactory, as also the fact that only about 7 per cent. of the samples received failed to germinate over 50 per cent. This compares favourably with the figures obtained for other vegetables. It must be pointed out, however, that the great majority of the samples tested were of Californian origin, a large proportion of which attained to a germination of over 90 per cent., 54 per cent. being the lowest figure recorded. Three French samples gave an average germination of 65 per cent.; whilst four English grown samples gave an average germination of only 57 per cent.

Carrot.—The average germination of the carrot samples was below 65 per cent., 94 per cent. being the highest figure recorded, whilst practically a quarter of the samples failed to germinate over 50 per cent. A large proportion of the samples could not, therefore, have been relied upon to give a satisfactory plant.

Garden Beet.—100 per cent. may be regarded as a satisfactory germination for garden beet; 74 per cent. of the samples received, however, failed to reach this figure, the average germination being only 84 per cent., which indicates a poor quality of seed.

Purity in Roots and Vegetables.—The seeds of roots and vegetables are usually, but by no means always, sent out in a high state of purity. Turnip, swede, cabbage and other crucifers frequently contain appreciable amounts of broken seed, 2 per cent., being not uncommon. Mangold, beet, onion, parsnip and carrot samples often contain a considerable amount of stem and chaffy matter with soil or dirt. As much as 10 and even 20 per cent. of inert matter has been met with in onion and mangold samples.

Weeds are not totally absent from root samples; and 2 per cent. of weeds have been found in some cases. The chief weed seeds occurring in roots and vegetables are:—

Campions (*Silene et Lychnis* spp.), black bindweed (*Polygonum Convolvulus*), nipplewort (*Lapsana communis*), buttercup (*Ranunculus* spp.), docks (*Rumex* spp.), cleavers (*Galium Aparine*), and chickweed (*Stellaria et Cerastium* spp.), with black mustard (*Brassica nigra*) in turnip, swede, and other crucifers.

Linseed.—The great majority of the linseed samples tested were from seed harvested in England. Although many of the samples had been selected, the average figure of 87·2 per cent. and the fact that 66 per cent. of the samples germinated over 90 per cent. indicate that seed with a satisfactory germinating capacity can be harvested in this country. The following average figures for linseed harvested in certain groups of counties, although not based on a sufficiently large number of samples, are of interest:—

4	samples *ex*	Northumberland, Cumberland, and Westmorland. Average Germination	94 per cent.
49	"	Cambs, Norfolk, Essex, Herts, and Suffolk	93 "
4	"	Surrey and Sussex	92 "
8	"	Devon and Somerset	80 "

Two samples of linseed (from Essex) contained seeds of the Linseed Dodder The chief impurities met with in samples (many of which had not been cleaned) were as follows:—

Fat hen (*Chenopodium* spp.), dock (*Rumex* spp.), redshank (*Polygonum Persicaria*), knot-grass (*Polygonum aviculare*), bindweed (*Convolvulus arvensis*), orache (*Atriplex* spp.) and excess of charlock (*Brassica sinapis*) and other crucifers.

GRASSES.

(See Table III., p. 651, and Table IV., p. 652.)

Perennial Rye-grass.—The average germination of 77·1 per cent. was somewhat below the average figures recorded by Stapledon and Jenkin for 1915 and 1916, but higher than the figures given by Biffen for 1912 and 1913. The majority of the samples germinated between 80 per cent. and 90 per cent. The Irish and English samples gave a very similar average germination, whilst the samples from Scotland were somewhat higher. The average purity (*i.e.*, 2·23 per cent.) cannot be regarded as satisfactory when it is realised that 51 per cent. of the samples contained 1 per cent. or over of injurious weed seeds. These consisted for the most part of Yorkshire fog (*Holcus lanatus*) and soft brome (*Bromus mollis*), both of which occurred in varying amount in over 90 per cent. of the samples, as much as 10 per cent. of these weeds having been

met with in samples. Rat's tail fescue (*Festuca bromoides*), suckling clover (*Trifolium dubium*), cat's ear (*Hypochoeris radicata*) and buttercup (*Ranunculus* spp.) were also frequently occurring weed seeds in perennial rye-grass.

TABLE III.—*Showing the Percentage Purity and Germination of Grasses.*

	Average percentage of Impurities.	Percentage of Samples with 1 per cent. or over of Injurious Weeds.	Percentage of Germination.			Percentage of Samples Germinating between			
			Highest.	*Lowest.*	Average.	100–90 Per cent.	89–80 Per cent.	79–51 Per cent.	50–0 Per cent.
Perennial Rye-grass	2·23	51·0	98	14	77·1	13·4	42·0	39·1	5·5
Italian Rye-grass	1·19	33·0	98	34	75·7	8·3	30·0	59·7	2·0
Cocksfoot..	6·64	6·0	95	1	62·7	3·2	15·6	57·6	23·6
Timothy ..	1·74	1·0	100	0	85·3	64·7	12·9	16·3	6·1
Meadow Fescue	3·28	23·0	99	12	57·3	10·5	17·1	28·9	43·5
Crested Dog's Tail	2·05	6·0	93	2	66·2	7·4	29·6	42·7	20·3

Italian Rye-grass.—The average germination was a little lower than that of perennial rye-grass, a much larger number of these samples germinating below 80 per cent.

The average was higher than that recorded by Biffen for 1913, but lower than Biffen's figure for 1912 or Stapledon's and Jenkin's figures for 1915 and 1916.

The samples from Scotland gave a higher average germination than those harvested in Ireland, France, or England. Perennial rye-grass frequently occurred in large amount in samples of Italian rye-grass. The average purity (independent of included perennial rye-grass) was higher than that of perennial rye-grass. Injurious weeds were on the average less abundantly present, Yorkshire fog (*Holcus lanatus*) and cat's ear (*Hypochoeris radicata*) in particular being less frequent. It will be noted, however, that in the main the distribution of weed seeds in the two rye-grasses was very similar and differed in several respects from that in other grasses.

Ergot (*Claviceps purpurea*) was present in a few samples; and several samples would seem to have represented bulks that had been carried over from a previous year and badly stored, in so much as they showed evidence of having been attacked by mice and (or) insects.

Cocksfoot.—The average germination of 62·7 per cent. was lower than the various figures recorded by Biffen, Stapledon and Jenkin for the previous five years; over 20 per cent. of

TABLE IV.—*Showing the Percentage Occurrence of Certain Weed and other Seeds in Samples of Grasses.*

	Perennial Rye-grass.	Italian Rye-grass.	Cocksfoot.	Meadow Fescue.	Crested Dog's Tail.
Buttercup (*Ranunculus* spp.)	28	17	26	1	6
Trefoil (*Medicago lupulina*)	3	10	27	5	4
Suckling (*Trifolium dubium et* spp.)	56	42	6	7	32
Madder (*Sherardia arvensis*)	14	18	2	0	26
Ox-eye Daisy (*Chrysanthemum leucanthemum*) ..	0	5	10	0	24
Crepis spp.	0	0	17	0	86
Cat's Ear (*Hypochoeris radicata*)	35	18	7	0	44
Prickly Sowthistle (*Sonchus asper*)	0	5	2	0	54
Rib-grass (*Plantago lanceolata*)	16	12	19	4	48
Sheep Sorrel (*Rumex Acetosella*)	17	11	7	0	34
Bromus spp. (mainly *B. mollis*)	92	86	58	79	2
Rat's-tail Fescue (*F. bromoides*)	69	59	4	1	42
Yorkshire Fog (*Holcus lanatus*)	97	77	56	11	60
Rye-grass (*Lolium* spp.) ..	—	—	81	18	28

The following percentage occurrences were also found :—
Anthemis arvensis—14 in Cocksfoot. *Plantago aristata*—33 in Meadow Fescue. *Polygonum Persicaria* et spp.—18 in Meadow Fescue. Dock (*Rumex* spp.)—23 in Meadow Fescue, 2 in Crested Dog's Tail. Nipplewort (*Lapsana communis*)—56 in Crested Dog's Tail. *Aira Caryophyllea*—20 in Crested Dog's Tail.

the samples under review moreover germinated less than 51 per cent. The average of four American samples gave a germination of 79·2 per cent., the average of the Danish samples was 75·0 per cent., whilst that of seven French samples was 62·1 per cent. It will be noted that the average impurity of cocksfoot was as high as 6·64 per cent., being considerably higher than that of other grasses. The most abundant impurity in cocksfoot was, however, perennial rye-grass, which not infrequently constituted over 10 per cent. of the sample. Other useful grasses often occurring in cocksfoot to an appreciable extent were meadow fescue, sweet vernal grass and tall oat grass. Yorkshire fog (*Holcus lanatus*) and soft brome (*Bromus mollis*), however, both occurred in over 50 per cent. of the samples, and not infrequently to an extent of over 1 per cent. It is interesting to note that trefoil occurred more frequently in cocksfoot than in other grasses, whilst *Anthemis arvensis* was not uncommon in samples of cocksfoot.

Timothy.—Timothy invariably attains to a higher average germination than other grasses; and a germination of well over 90 per cent. should always be expected. This fact, together with the large number of seeds to the pound, entitles Timothy to be considered as one of the cheapest grass seeds. It is evident, however, that the average quality of Timothy samples (germination 85·3 per cent.) has been relatively poor this year.

Biffen recorded an average real value of 92·6 per cent. in 1913, and Stapledon recorded an average germination of 95 per cent. in 1913 and 94 per cent. in 1916; Jenkin, however, reporting on a few samples in 1915, gives an average of 81 per cent. That very poor (generally old) samples of timothy are put on the market is, however, indicated by the fact that one sample was received incapable of germination and that 6 per cent. of the samples germinated less than 51 per cent.

Timothy samples frequently contained less than ·5 per cent. of impurity, and when impure the most frequent and abundant impurities were the seeds of alsike and white clover (both occurring in over 50 per cent. of the samples) and weed seeds (see Table VI., p. 656) such as are most usually met with in small clovers, *e.g.*, sheep sorrel (*Rumex Acetosella*), which was found in 44 per cent. of the samples.

That timothy does not usually contain a large amount of injurious weed seeds is shown by the fact that only 1 per cent. of the samples included 1 per cent. or over of such weeds.

The nature of the impurities in Timothy, moreover, indicated that the great majority of the samples were of North American origin; *Potentilla monspeliensis*, for instance, was found in 41 per cent. of the samples. It should be noted that dodder (*Cuscuta* spp.) was found in a few of the samples tested.*

Meadow Fescue.—The average germination of meadow fescue (57·3 per cent.) was lower than that of any of the other grasses and also lower than that of any of the leguminous herbage plants, with the single exception of sainfoin.

That meadow fescue was much below the average quality of recent years is suggested by the fact that 80 per cent. (in 1913) is the lowest average given in the records (1913–16) previously referred to. A limited number of high class samples were, however, obtainable, for despite the low average germination 10 per cent. of the samples germinated over 90 per cent.

Soft brome (*Bromus mollis* et spp.) was the most frequently occurring injurious weed seed in meadow fescue, 23 per cent. of the samples containing 1 per cent. or over of injurious weed seeds (almost wholly varieties of soft brome). *Plantago aristata*, although not harmful as a weed in this country, is a common impurity in meadow fescue, and the seeds of dock (*Rumex* spp.) were more frequently met with than in samples

* Stapledon, in 1916, recorded the presence of clover dodder in two out of 28 samples of Timothy.

of other grasses. Several of the samples contained high percentages of perennial rye-grass; 16 per cent. and 32 per cent. of this valuable, but much cheaper seed being met with, and one sample sent to the Station as meadow fescue contained 36·5 per cent. of cocksfoot. There is little doubt that a large number of the samples sent to the Station represented old stocks, for the seed of this grass does not keep well.

Crested Dog's Tail.—The average germination of this grass was 66·2 per cent., and it is interesting to note that the average germination of ten samples stated to have been grown in Ireland was 74·8 per cent. Four samples were received with a germination of less than 7 per cent. Crested dog's tail samples frequently contained over 1 per cent. of weed seeds; the "injurious" weeds being most usually Yorkshire fog (*Holcus lanatus*) caryopses, sheep sorrel (*Rumex Acetosella*) and suckling clover (*Trifolium dubium*) (not now scheduled with injurious weeds). Nipplewort (*Lapsana communis*), crepis (*Crepis virens*), prickly sowthistle (*Sonchus asper*), cat's ear (*Hypochoeris radicata*), madder (*Sherardia arvensis*) and ox-eye daisy (*Chrysanthemum leucanthemum*) were moreover characteristic impurities in this grass. Crepis (*Crepis virens*) should certainly be regarded as a harmful weed, for it frequently abounds in young leys treated as meadows; whilst ox-eye daisy (*Chrysanthemum leucanthemum*) rapidly reproduces itself when introduced into prepared meadows. Rye-grass and Timothy with such small grasses as *Poa* spp., *Agrostis* spp., silver hair grass (*Aira caryophyllea*) and *Alopecurus geniculatus* were also commonly met with in samples of crested dog's tail.

CLOVERS AND OTHER LEGUMINOUS HERBS.

(See Table V., p. 655, and Table VI., p. 656.)

Red Clover.—No distinction has been made between "broad red clover," "late flowering red clover," and ordinary "cow grass" in this Report. It will be noted that the average germination of the large number of red clover samples received (1,249) was only 67 per cent.; which is about on a par with the figures given by Biffen for 1912, 1913 and 1914, but decidedly lower than the figures given by Stapledon for 1916. The average impurity, although over 3 per cent., was less than that of alsike or white clover. Attention is directed to the particulars given in Tables VI. and VII. relative to the country of origin of red clovers. It will be noted that the germination of Chilian and Canadian samples was nearly the same, the average figure for both being practically 90 per cent., none of the

samples germinating less than 50 per cent. The French samples also reached the high average figure of 87·2 per cent., with not more than 5 per cent. of the samples germinating less than 50 per cent. The British samples, however, only averaged just over 60 per cent.,* with nearly 30 per cent. germinating under 50 per cent., of which a large proportion failed to reach 10 per cent.; a considerable proportion of the British samples were, of course, representative of "yearling" or "over-year" stocks.

TABLE V.—*Showing the Percentage Purity and Germination of Clovers.*

	Average percentage of Impurities.	Percentage of Samples with 1 per cent. & over of Injurious Weeds.	Percentage of Germination.			Average percentage of Hard Seed.	Percentage of Samples Germinating between			
			Highest.	Lowest.	Average.		100–90 Per cent.	89–80 Per cent.	79–51 Per cent.	50–0 Per cent.
Red Clover..	3·40	·5	99	0	67·0	3·8	18·1	24·4	33·8	23·7
Alsike Clover	4·58	3·2	97	1	75·3	8·3	20·9	38·4	28·6	12·1
White Clover	9·98	17·2	98	0	72·3	8·0	9·0	29·9	52·4	8·7
Wild White Clover	16·18	70·0	91	14	64·2	15·0	2·6	23·6	52·8	21·0
Trefoil ..	1·18	Nil.	98	3	64·2	1·9	19·5	11·6	42·4	26·5
Lucerne ..	2·01	Nil.	96	33	84·9	6·3	34·6	49·5	13·3	2·6
Sainfoin ..	2·01	*	96	0	53·2	—	2·9	7·3	54·6	35·2
Crimson Clover	2·14	Nil.	99	7	81·4	·1	51·5	12·2	30·3	6·0

* Two samples contained over 5 per cent. of Burnet.

The fact that the Chilian and Canadian samples contained on the average nearly twice as much "hard" seed as the British and French is also of interest as indicating that "hardness" in red clover seed is influenced to a marked degree by climatic conditions, and that those climatic factors which make for excellence of germination also tend to favour hardness.†

In the matter of purity also the British samples will be seen on the average to have been more impure than the imported samples, whilst those from Chili and Canada were of the highest average purity.

The facts given in Table VI. as to the specific weed seeds of commonest occurrence in red clovers of different origin are of considerable interest and may be briefly summarised as follows:—

* The average figure given by Stapledon for British red clovers tested in 1916 was over 80 per cent.

† It has been noted also that samples harvested in Wales and the West of England tend to be less "hard" than those saved in our eastern and southern

TABLE VI.—*Showing the Percentage Occurrence of Certain Weed and Other Seeds in Samples of Clovers and Timothy.*

—	Red Clover. English.	Red Clover. French.	Red Clover. Chilian.	Red Clover. Canadian.	Alsike.	White Clover.	Trefoil.	Lucerne.	Timothy.
					Under	Just over			Under
Dodder (*Cuscuta* spp.)	24	19	82	30	1	1	0	7	1
Brassica spp.	4	2	22	0	0	0	3	4	0
Campions (*Lychnis and Silene*)..	29	19	0	10	57	44	26	1	3
Mouse-eared Chickweed (*Cerastium* spp.)	1	0	0	0	16	30	0	0	8
Common Chickweed (*Stellaria* spp.)	2	0	0	0	9	29	4	0	1
Cutleaved Cranesbill (*G. dissectum*)	51	2	2	7	4	9	32	1	0
Soft Cranesbill (*G. molle* et *pusillum*)	11	1	0	0	20	82	5	0	1
Kidney Vetch (*Anthyllis vulneraria*)	1	5	0	0	0	0	1	0	0
Birdsfoot Trefoil (*Lotus corniculatus*)	3	10	0	0	0	1	0	1	0
Trefoil (*Medicago lupulina*) ..	14	18	3	0	71	69	—	7	2
Lucerne (*M. sativa*)	5	30	23	3	4	1	2	—	0
Melilotus spp.	1	0	12	7	0	0	1	4	0
Alsike (*T. hybridum*)	21	10	13	53	—	72	7	4	79
Suckling (*T. dubium* et spp.) ..	1	0	2	0	21	58	5	0	3
White Clover (*T. repens*) ..	14	6	2	13	90	—	4	4	64
Caucalis nodosa	11	6	0	0	4	2	2	6	0
Wild Carrot (*Daucus carota*) ..	19	65	0	7	1	2	1	19	0
Madder (*Sherardia arvensis*) ..	14	0	2	0	8	49	52	0	1
Ambrosia artemisiæfolia ..	0	1	0	13	0	0	0	0	0
Stinking Mayweed (*Anthemis cotula*)	2	1	0	3	10	4	0	0	4
Chicory (*Cichorium Intybus*) ..	2	7	3	3	0	0	0	3	0
Thistle (*Cirsium* spp.)* ..	4	3	10	3	13	4	0	1	1
Oxtongue (*Picris echioides*) ..	2	6	0	0	2	0	1	30	0
Forget-me-not (*Myosotis* spp.)	2	0	2	7	17	25	3	0	4
Self Heal (*Prunella vulgaris*) ..	9	11	0	7	18	18	2	4	6
Verbena spp.	1	7	0	0	2	1	0	0	5
Ribgrass (*Plantago lanceolata*) ..	80	93	73	47	21	49	15	90	9
Broad Plantain (*P. major*) ..	2	0	0	0	9	6	1	0	9
Amaranthus spp.	1	0	0	3	7	1	0	4	0
Fat Hen (*Chenopodium* and *Atriplex*)	9	17	7	43	36	8	1	9	9
Polygonum Persicaria et spp. ..	1	1	0	20	1	0	1	1	0
Dock (*Rumex* spp.)	21	10	30	23	13	8	15	7	4
Sheep Sorrel (*R. Acetosella*) ..	6	10	5	40	54	35	4	0	44
Rye-grass (*Lolium* spp.) ..	21	15	3	0	2	3	5	4	3
Timothy (*Phleum pratense*) ..	2	1	0	50	78	10	1	3	—
Setaria viridis	3	16	2	73	10	1	0	19	3

* Mainly Spear Thistle in Chilian Red Clover and Creeping Thistle in the other cases.

The following percentage occurrences were also found :—

Camelina microcarpa—14 in Alsike, 5 in Timothy. *Lepidium* spp.—3 in Alsike, 16 in Timothy. *Sisymbrium altissimum*—1 in Canadian Red Clover, 5 in Alsike, 1 in Timothy. *Potentilla monspeliensis* et spp.—4 in Alsike, 41 in Timothy. *Centaurea maculosa*—16 in Lucerne. *Rudbeckia hirta*—9 in Timothy. *Plantago Rugelii*—1 in Canadian Red Clover, 1 in Alsike, 8 in Timothy.

CHILIAN.—These samples contained the seeds of Chilian clover dodder in no less than 82 per cent. of the samples, over 1 per cent. of this parasite being six times met with and one sample containing as much as 5·2 per cent. Of harmful weeds to grass land in this country these samples contained both docks (*Rumex* spp.) and thistles (*Cirsium* spp.) more frequently than clovers from other sources. The cranesbills (*Geranium* spp.), wild carrot (*Daucus carota*) and campions (*Silene* et *Lychnis* spp.) were, however, not frequent in Chilian samples; diagnostic features were the occurrence of lucerne (also abundant in French samples) and in particular the presence of seeds of various species of *Brassica* and of *Melilotus*.

TABLE VII.—*Showing Comparative Purity and Germination of Red Clovers of Different Nationalities.*

	Average percentage of Impurities.	Percentage of Germination.			Average percentage of Hard Seed.	Percentage of Samples Germinating between			
		Highest.	Lowest.	Average.		100–90 Per cent.	89–80 Per cent.	79–51 Per cent.	50–0 Per cent.
All Samples	3·40	99	0	67·0	3·8	18·1	24·4	33·8	23·7
English ..	3·38	98	1	60·9	3·7	7·1	21·5	42·4	29·0
French ..	3·00	98	34	87·2	2·6	56·0	30·5	8·7	4·8
Chilian ..	1·23	97	74	90·0	6·7	59·5	37·2	3·3	Nil
Canadian..	1·41	97	66	88·9	6·9	60·8	32·1	7·1	Nil

Five samples out of 1,250 contained 1 per cent or over of Injurious Weeds.

No figures are given for Clovers from U.S.A. since it appeared that many of the samples sent in as "American" were either of Canadian or Chilian origin.

CANADIAN.—These clovers have been regarded as being remarkably free from dodder ; this parasite (usually the Chilian species) was, however, found in 30 per cent. of the samples sent to the Station as Canadian. Of harmful weed seeds, sheep sorrel (*Rumex Acetosella*) was more frequent in Canadian than other samples ; dock (*Rumex* spp.) was also frequent, and campions (*Silene* et *Lychnis* spp.) were not uncommonly met with. Wild carrot (*Daucus carota*) and cut-leaved geranium (*Geranium dissectum*), although much less plentiful than in British samples, also occurred. Diagnostic features were the frequent occurrence of fat hen (*Chenopodium* spp.), *Polygonum* spp., *Setaria viridis*, and *Ambrosia artemisiifolia*. Timothy and alsike clover also occurred in half the samples. It may be remarked that rib-grass (*Plantago lanceolata*), which is the outstanding impurity in red clovers generally, occurred less frequently in Canadian than other samples.

FRENCH.—The weed seeds met with in these samples were in the main very similar to the British. The most striking feature of the French clovers was, however, the frequent presence of wild carrot (*Daucus carota*), which occurred considerably more often in French than in British samples, the position, however, being reversed in the case of cut-leaved cranesbill (*Geranium dissectum*). Bird's-foot trefoil (*Lotus corniculatus*), ox-tongue (*Picris echioides*) and *Verbena* spp. are in the main to be regarded as characteristic French impurities. Lucerne and chicory also occurred more often in French than in other samples. The European clover dodder was frequent in both French and British samples.

BRITISH.—Rye-grass, trefoil and knotted parsley (*Caucalis nodosa*) were impurities more essentially met with in British and French samples, whilst cut-leaved cranesbill (*Geranium dissectum*) is to be regarded as the most characteristic British weed. Campions (*Silene* et *Lychnis* spp.), madder (*Sherardia arvensis*) and soft cranesbills (*Geranium molle et pusillum*) were also more plentiful in British than in other samples, whilst docks (*Rumex* spp.), more plentiful than in French samples, occurred to a greater extent in both Chilian and Canadian clovers.

A large number of samples sent to the Station as British almost certainly contained at least an admixture of red clover of other nationalities, containing as they did weeds such as *Setaria viridis*, *Verbena* spp., *Amaranthus* spp., *Ambrosia* spp., *Malva* spp. and *Melilotus* spp., and other foreign impurities. Moreover, Chilian dodder was found in over 30 samples purporting to be of British origin.*

The significance of the above facts as to the nationality of red clovers is referred to in the summary at the end of the Report.

About a dozen samples were sent to the Station described as "ribby" red clover; these were mixtures of ribgrass and red clover in about equal proportions, and were remarkable for the fact that their average purity was less than that of red clovers proper.

The majority of the red clovers received were not accompanied with a statement as to their nationality. Many of these were designated "yearling;" 70 of such samples gave an average germination of but 16·4 per cent.

The balance of samples consisted chiefly of blends of different nationalities, and the evidence suggested that several of these were so made up that the contained British seed did not contribute very materially to the germination of the blend as such.

With regard to the purity of red clovers as a whole, although comparatively few samples contained 1 per cent. of injurious weed seeds as scheduled in the Order, it is to be noted that dock (*Rumex* spp.) contributed over 1 per cent. to three samples. Campions (*Silene* et *Lychnis* spp.) and cut-leaved cranesbill (*Geranium dissectum*), however, occurred to an extent of 1 per cent. and over in several samples, the former having reached 5 per cent. Ribgrass (*Plantago lanceolata*), rye-grass and trefoil have all been met with to an extent of over 10 per cent.

Alsike Clover.—The average germination of alsike clover (75·3 per cent.) was higher than that of either red or white clover, and was also higher than the average figures obtained by Biffen in 1912, 1913, or 1914, or by Stapledon in 1913, but not quite as high as Stapledon's or Jenkin's figures for 1915 and 1916.

It is of interest to note that the alsike samples were very variable, for whereas 20 per cent. of the samples germinated

* The question of the country of origin of red clovers is now under further investigation at the Station, and it is hoped to publish a Report on the work at a later date.

90 per cent. or over, 12 per cent. failed to reach 51 per cent. The average impurity of alsike clover, although greater than that of red, was considerably less than that of white clover, which is in accord with results obtained in previous years.

The most striking feature in reference to specific impurities was the comparative scarcity of dodder (*Cuscuta* spp.) which would seem to have been less plentiful in this clover since the War, as the figures in Table VIII. indicate.

TABLE VIII.

Year and Recorder ..	1912. Biffen.	1913. Biffen.	1914. Biffen.	1915. Stapledon.	1916. Stapledon.	1918. S.T.S.
Percentage number of samples in which Dodder occurred.	65	38	32	about 10	about 6	less than 1

In this connection it is to be noted that the evidence of the contained weed seeds (see Table VI.) shows that a very large proportion of the samples were of North American origin, European supplies having doubtless been cut off to a large extent as the direct result of the War.

The harmful weed seeds chiefly met with in alsike were campions (*Silene et Lychnis* spp.), soft cranesbills (*Geranium molle et pusillum*) (much more plentiful in white clover), self heal (*Prunella vulgaris*), sheep sorrel (*Rumex Acetosella*), thistle (*Cirsium* spp.), forget-me-not (*Myosotis scorpioides*), and May-weeds (*Anthemis* spp.), whilst white clover, suckling clover, trefoil and Timothy were of frequent occurrence. Injurious weeds (even when suckling clover is included amongst these) did not, however, frequently exceed 1 per cent., sheep sorrel (*Rumex Acetosella*), self heal (*Prunella vulgaris*) and soft cranesbills (*Geranium molle et pusillum*) being the more harmful weeds met with in the greatest amount.

White Clover (*not including Wild White*).—Although the average germination of white clover was not much below that of alsike, far fewer samples reached a germination of 90 per cent. or over. As in the case of alsike, dodder would seem to have been progressively less frequent over the period 1912–18. Biffen gives the average percentage occurrence for 1912, 1913 and 1914 together as 35 per cent., and Stapledon for 1915–16 together gives the figure 19 per cent. The figure for 1918 obtained on the samples under review was only just over 1 per cent.

It is interesting to note that dodder was only found in samples *of white clover which also contained considerable amounts of* red clover.

White clover will be seen on the average to have contained a considerably higher percentage of impurity than other clovers or grasses. It is to be noted, however, that trefoil was frequently present in large amounts, 20 per cent. of this useful but relatively much cheaper seed having been met with. Suckling clover was of equally frequent occurrence, 5 per cent. of this impurity being not uncommon, and as much as 17 per cent. having been met with. The extent to which suckling clover occurred even in ordinary white clover was moreover indicated by the fact that 17 per cent. of the samples contained 1 per cent. or over of "injurious" weed seeds, sheep sorrel (*Rumex Acetosella*) being the injurious weed proper associated with suckling clover in these cases. Sheep sorrel (*Rumex Acetosella*), however, although of very frequent occurrence in white clover, was found even more often in alsike. The outstanding weed impurities met with in white clover were soft cranesbills (*Geranium molle et pusillum*), which occurred in varying amount in 82 per cent. of the samples, as much as 4 per cent. being frequent and 12 per cent. having been more than once met with. Mouse-eared chickweeds (*Cerastium* spp.) were a fairly frequent impurity, one sample containing 18·5 per cent. of these weeds; campions (*Silene* et *Lychnis* spp.), madder (*Sherardia arvensis*), self heal (*Prunella vulgaris*) and forget-me-not (*Myosotis scorpioides*) were also of frequent occurrence in white clover. It is to be noted that both alsike and white clover contained considerably more "hard" seed than did red clover seed, this being in accord with the records for previous years.

Wild White Clover.—A comparison between samples of white clover and samples sent to the Station as wild white clover may be of interest.

Of the 30 samples of wild white, the majority were doubtless genuine, but in a few cases the nature of the contained weed impurities suggested that the samples were not wholly gathered from permanent pasture. The occurrence of such typical weeds of arable land and rotation grass as field madder (*Sherardia arvensis*), field forget-me-not (*Myosotis scorpioides*) and stinking mayweed (*Anthemis cotula*) in certain samples and the fact that over half the samples contained varying amounts of alsike, would appear to indicate either some admixture of ordinary white clover seed or the probability that some of the samples were wild white "once grown." This naturally raises the question as to the desirability or otherwise of describing "once grown" wild white as true wild white. In view of

the limited amount of information on this subject, and the fact that a buyer of wild white naturally expects a sample that has been harvested direct from permanent grass land, the opinion of the Station is that the term "wild white clover" should be applicable only to seed so harvested and not to seed "once grown."

TABLE IX.—*Showing comparatively the Purity, Germination and Contained Impurities of White and Wild White Clovers.*

	White Clover.	*Wild White Clover.*
Average percentage of impurity	9·96	16·18
Percentage of samples with 1 per cent. and over of injurious weeds	17·2	70·0
Percentage germination. Highest ..	98	91
,, ,, Lowest	0	14
,, ,, Average ..	72·3	64·2
Average percentage of hard seed	8·0	15·0

Occurrence of weed and other seeds per 100 samples.

	White.	*Wild White.*
Campions (*Silene et Lychnis* spp.)	44	0
Mouse-eared Chickweed (*Cerastium* spp.)	30	40
Common Chickweed (*Stellaria* spp.)	29	13
Cutleaved Cranesbill (*G. dissectum*)	9	3
Soft Cranesbill (*G. molle et pusillum*)	82	13
Birdsfoot Trefoil (*Lotus* spp.)	1	30
Alsike Clover	72	57
Suckling Clover ..	58	87
Trefoil	69	60
Cinquefoil (*Potentilla reptans*)	0	17
Madder (*Sherardia arvensis*)	49	7
Mayweed (*Anthemis cotula*)	4	3
Self Heal (*Prunella vulgaris*)	18	80
Forget-me-not (*Myosotis scorpioides*)	25	7
Ribgrass (*P. lanceolata*)	49	77
Broad Plantain (*P. major*)	6	13
Fat Hen (*Chenopodium* spp.)	8	0
Dock (*Rumex* spp.) ..	8	20
Sheep Sorrel (*R. Acetosella*)	35	10
Rushes and Sedges (*Luzula et Carex*)	0	27
Agrostis spp.	2	43
Dog's Tail	1	67
Rye-grass	3	17
Sweet Vernal Grass ..	1	17
Timothy	10	20
Yorkshire Fog	3	40

The above table (Table IX.) gives comparative figures for the two white clovers. The purity and germination of the wild white, as might be expected, is lower than that of ordinary white clover, whilst the amount of hard seed is higher. With respect to weed and other impurities, the fact that most of the impurities in wild white are seeds of other useful plants, mainly the grasses and leguminous plants of old pasture, must be noted. The most characteristic impurities of wild white would appear to be the seeds of woodrush and sedges (*Luzula* and *Carex* spp.), cinquefoil (*Potentilla reptans*), self heal (*Prunella vulgaris*), birdsfoot trefoil (*Lotus corniculatus*), suckling, and an abundance of small grass seeds. Of these, suckling clover

occurs in the greatest amount, over 20 per cent. and in one instance over 50 per cent. of this impurity having been met with in samples. With wild white clover fetching 15s. to 20s. per lb., and suckling clover not worth more than 1s. per lb., there is no denying the fact that suckling clover is a serious impurity in samples purporting to be wild white clover.

Mixtures of Alsike and White Clover.—About 90 samples described as "alsike and white" were tested. In only two cases did white clover preponderate over alsike in these mixtures, the amount of white clover present being usually from 20 per cent. to 30 per cent. of the bulk. The germination was quite satisfactory, that of alsike in mixtures being slightly above the average germination of alsike, whilst the germination of white clover was about 4 per cent. above the average of white clover samples. These mixtures, however, usually contained a large percentage of impurity. Moreover, 36 per cent. of the samples contained 1 per cent. and over of "injurious weeds," chiefly suckling clover, whereas only 3·2 per cent. of alsikes and 17·2 per cent. of white clovers contained this amount of suckling clover and injurious weed seeds proper. It should also be noted that the mixtures of alsike and white contained dodder in 6 per cent. of the samples, whilst alsike alone only contained dodder in under 1 per cent. of the samples, and white clover in just over 1 per cent. of the samples.

Trefoil.—The average germination of trefoil (64·2 per cent.) would seem to have been lower than the average for recent years. More of the current samples germinated below 50 per cent. than in the case of any of the other leguminous herbs or grasses, with the exception of meadow fescue and sainfoin. Trefoil was on the average cleaner than other leguminous herbs, and broken seed contributed very appreciably to the impurity. The nature of the included weed seeds indicated that the majority of the samples received were of British origin, French samples being, however, frequent. The outstanding impurity in trefoil was field madder (*Sherardia arvensis*) which occurred more often than in other herbage plants. Cut-leaved cranesbill (*Geranium dissectum*), campions (*Silene et Lychnis* spp.) and docks (*Rumex* spp.) were also frequent, whilst ribgrass (*Plantago lanceolata*) was much less plentiful in trefoil than in the clovers. Trefoil seldom contained much "hard" seed, although two samples sent to the station in husk contained about 8 per cent. of such seed. This suggests that the process of "hulling" the seed tends to obviate "hardness."

Lucerne.—The average germination of lucerne (84·9 per cent.) was practically the same as that of Timothy, these two species attaining to a higher average than did any other herbage plants.

On the average the lucerne samples were relatively pure, broken seed contributing appreciably to the impurity. One sample, however, contained over 9 per cent. of trefoil. Ribgrass (*Plantago lanceolata*), wild carrot (*Daucus carota*), ox-tongue (*Picris echioides*) and *Setaria viridis* were the most abundant and frequent weed impurities.

The great majority of the samples were presumably of French origin, for, as well as ox-tongue (*Picris echioides*), such weeds as *Centaurea maculosa* and *Malva* spp. were of common occurrence. Dodder in small amount was present in 7 per cent. of the samples. There is a decided tendency to "hardness" in lucerne, for whereas the French red clovers gave an average of 2·6 per cent. "hard" seed, the average for lucerne was 6·3 per cent.

Sainfoin.—The average germination of these samples (53·2 per cent.) was not satisfactory; two samples proved incapable of germination, and 35 per cent. did not reach a germination of 51 per cent. It is noteworthy that the milled samples gave a slightly higher germination than the un-milled, whereas Biffen in 1912–1913 had found the opposite to be the case. On the average the French samples gave a slightly higher germination than did the English.

The purity of the majority of the samples was satisfactory. Burnet (*Poterium* spp.), however, occurred to an extent of over 5 per cent. in two samples; whilst soft brome (*Bromus mollis* et spp.) was too plentiful in some of the samples. Darnel (*Lolium temulentum*), cleavers (*Galium Aparine*) and campion (*Silene* et *Lychnis* spp.) were also met with.

Crimson Clover.—The average germination (81·4 per cent.) of crimson clover was satisfactory; a few poor samples were, however, received.

The chief impurities present in addition to broken seed were Campions (*Silene* et *Lychnis* spp.), ribgrass (*Plantago lanceolata*), cut-leaved cranesbill (*Geranium dissectum*), madder (*Sherardia arvensis*) and cleavers (*Galium Aparine*). Dodder (*Cuscuta* spp.) occurred in one (French) sample. A noteworthy feature was the negligible amount of "hard" seed in all the

MISCELLANEOUS PLANTS.

(received in small numbers only.)

The average germination obtained in the case of a few species received in small numbers only is given in the table hereunder :—

TABLE X.

Maize	74.9	Mustard	91.3
Sunflower	93.0	Kohl Rabi	66.0
Buckwheat	91.0	Cauliflower	50.0
*Tomato	77.0	Broccoli	84.0
Lettuce	96.0	Yarrow	74.2
*Hemp	19.0	Chicory	53.2

* One sample only.

It is only necessary to remark that the majority of the maize samples received at the Station were of South African origin; a few of these contained over 5 per cent. of inert matter consisting of broken seed and remains of the cob. The highest germination of these samples was 100 per cent., and the lowest 6 per cent.

GERMINATION OF CERTAIN WEED SEEDS.

A few germination tests of certain weed seeds were made with the following results. The nature and germination of the sample from which they were obtained is given for comparison :—

Weed.	*Germination per cent.*		*Occurring in per cent.*
Soft cranesbill (*Geranium molle*)	94	White clover	(77)
,, ,, ,,	96	,,	(84)
Cut-leaved cranesbill (*Geranium dissectum*)	94	Red clover	(65)
Campion (*Lychnis* spp.)	89	Alsike	(81)
Ribgrass (*Plantago lanceolata*)	73	Red clover	(21)
Madder (*Sherardia arvensis*)	73	White clover	(96)
Suckling clover	93	,,	(72)
Crepis (*Crepis virens*)	62	Dog's Tail	(58)
,, ,,	30	,,	(66)
Cat's Ear (*Hypochæris radicata*)	25	Perennial rye-grass	(82)
,, ,, ,,	42	,, ,,	(87)
Ox-eye daisy (*Chrysanthemum leucanthemum*)	23	Italian rye-grass	(88)
Yorkshire fog (*Holcus lanatus*)	70	,, ,,	(78)
Soft brome (*Bromus mollis* et spp.)	88	,, ,,	(86)
,, ,, ,,	98	,, ,,	(78)
Rat's-tail fescue (*Festuca bromoides*)	90	,, ,,	(75)

Most of the above figures represent the average of three separate hundreds. It is interesting to note that in many cases the germination of the weed is better than that of the sample in which it is contained. As, however, the weed seeds were picked out by hand from the bulk samples a certain amount of " selection " probably occurred, and the figures given above must be taken as refering to good plump seeds. The results clearly indicate, however, that many of the commonly occurring weed seeds have a high germinating capacity even when present in comparatively poor samples of grasses and clovers.

SUMMARY AND CONCLUSIONS.

The particulars given in the body of the Report suggest that, in the interests of increased food production, the following points in particular demand the attention of farmer and seedsman alike.

Germination.—The fact that 71 samples, or approximately 1 per cent. of all the samples received at the Station during the season, germinated 5 per cent. or less, clearly indicates that much worthless seed is liable to get into the hands of farmers and to be sown with a view to crop production. It is evident moreover that a poor germinating capacity should be guarded against in the case of all varieties of seeds. It must in particular be emphasised that the germinating capacity of cereals is very deceptive, and it is an undoubted fact that wheat and oats especially should in all doubtful cases be subjected to a germination test before reliance is placed upon samples for seed purposes.

Certain kinds of seeds should be purchased with special caution with regard to germination ; this is especially so in the case of kale, cabbage and allies, parsnip, carrot, beet, red alsike and white clovers, trefoil, sainfoin, cocksfoot and meadow fescue.

The quality of a few kinds of seed would seem to have been decidedly below the average of recent years, *e.g.*, vetches, English red clovers (the yearling samples being remarkable for an unusually poor capacity of germination), trefoil, meadow fescue, Timothy, scarlet runner and French beans. Mangold seeds were probably above the average.

Purity.—It has been emphasised that more attention should be given by farmers to the purity of cereals for seed purposes ; the same is true of vetches which, like cereals, are sown in large quantities per acre, and which, even if containing less than 1 per cent. of weed seeds, may nevertheless be responsible for the introduction of many thousands of bad weeds on arable land.

The rye-grasses and red clovers are not only liable to contain excessive amounts of harmful weed seeds, such as soft brome (*Bromus* spp.) and Yorkshire fog (*Holcus lanatus*) in the former, and dodder (*Cuscuta* spp.), docks (*Rumex* spp.), wild carrot (*Daucus Carota*), cranesbill (*Geranium dissectum*) and campions (*Silene* et *Lychnis* spp.) in the latter, but, since they are sown in large amounts per acre, they are fruitful disseminators of weed seeds. White clover tends to be more impure than alsike clover and also contains more harmful weeds; excess of the small-flowered cranesbill (*Geranium molle* and *G. pusillum*) and sheep sorrel (*Rumex Acetosella*) should in particular be guarded against. It is probable also that the extent to which crepis (*Crepis virens*) occurs in crested dog's tail should receive more attention at the hands of the farmer and the seedsman than heretofore. Although it is an admitted fact that dodder is not of much significance when present in clovers sown in Scotland and the North of England, it must also be appreciated that, generally speaking, it is not practicable to clean seeds with a view to use in certain specified localities only. The fact that dodder occurred in 26·9 per cent. of all the red clover samples, and in over 80 per cent. of Chilian samples (largely used as these are in southern and northern counties alike) and was not absent from alsike, white clover, crimson clover, lucerne and Timothy, is evidence that sufficient attention is not yet paid to the elimination of this parasite.

The purity of grasses and clovers commonly used for ordinary rotation and short temporary leys will become a matter of increasing importance in proportion as the newly-ploughed grass land is gradually brought into normal rotation husbandry. The figures given in the Report are, unfortunately, evidence that much totally uncleaned, or but partially cleaned, seed is still used by farmers in the formation of rotation grass.

In this connection it is well to realise, moreover, that the process of cleaning bulks full of weeds is both expensive and wasteful of good seed. Farmers are therefore urged to take every precaution when sowing seed for the production of seed, to secure absolutely clean seed for the purpose, and to sow such seed on land that has been well cleaned. This is the most satisfactory and economical means of securing supplies of pure seed. Since, owing to the provisions of the Testing of Seeds Order,* the trade are undoubtedly paying an increased amount of attention to the purity of their seeds, the grower who can offer harvests free from weed seeds should attract the best prices from prospective buyers.

* See this *Journal*, July, 1918., p. 477.

The Country of Origin of Certain Seeds in Particular.—It has been shown in the case of red clovers that the highest purity and germination tend to occur in samples harvested elsewhere than in Britain. It is important, therefore, that the inherent value of British-grown clovers should be realised. Chilian and other foreign clovers undoubtedly give good results for one-year leys, but such trials as have been conducted indicate that the highest yields are frequently obtained from selected British stocks, and that these in many districts "hold" on the land longer than foreign clovers. Similarly, the fact that wild white clover has a much lower average germination than ordinary white Dutch clover must not prejudice farmers against the use of this all-valuable home product.

Onion growers, moreover, very generally consider that the best yields are obtained from home-grown seeds, and similar views are held as to sainfoin and rape, particularly in certain districts. These points demand emphasis, since seed production may be regarded as almost a world-wide industry; the climate of Britain, also, is by no means the most suitable for the maturing and harvesting of all classes of seeds. The Testing of Seeds Order will have largely failed in its purpose if it tends to encourage the importation and use of foreign seeds simply on account of their high germinating capacity. Seeds should be selected for their productive capacity; the choice of samples, therefore, demands a careful weighing of the rival claims of (*a*) variety, (*b*) country or district of origin, (*c*) germination, and (*d*) purity. The Testing of Seeds Order now makes it possible for purchasers to take all those matters into consideration; the influence of the Order upon increased food production is therefore dependent in the last resort upon the farmer making the best use of the information necessarily supplied to him.

The Storage of Samples.—The condition of a large number of yearling samples sent to the Station by both farmers and merchants shows that in many cases not enough attention is paid to the condition under which seeds are stored. Several samples were rendered practically worthless as the result of the ravages of mice; while some samples were badly attacked by beetles, mites and other insects.

The Board are much indebted to Mr. T. J. Jenkin, B.Sc., Mr. S. P. Mercer, B.Sc., Mr. R. Robson, M.Sc., and Miss K. Sampson, B.Sc., for their valuable assistance at the Station during the height of the busy season. Thanks are also due to the Heads of the Agricultural Departments and College Authorities at the University College of North Wales, Bangor, the Armstrong

College, Newcastle-upon-Tyne, the East Anglian Institute of Agriculture, Chelmsford, and the University of Leeds, for kindly releasing the above members of their respective staffs for the period over and above the University vacation.

Directions with reference to sending samples to the Station and the fees to be paid are set out in—(a) Food Production Leaflet No. 47 (for the use of farmers) and (b) Notice to Seedsmen S.T.8 (for the use of seedsmen). Copies of the former may be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1, and of the latter on application to the Director-General, Food Production Department, 72, Victoria Street, London, S.W. 1.

SOME RECENT INVESTIGATIONS ON THE FOOD OF CERTAIN WILD BIRDS.

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I.—INTRODUCTION.

THE study of economic ornithology is one that has been woefully neglected in this country, and the value of many of the earlier contributions to the subject is seriously minimised owing to the methods employed in estimating the food contents of the crop and stomach.

At the present time any factor that bears injuriously upon agriculture is worthy of more than ordinary attention, for it is evident that for some years to come our home-grown food supply will be a vital necessity to the people of this country.

The relationship existing between the feeding habits of wild birds and agriculture is as yet only very imperfectly realised. On the one hand we have a rapidly decreasing number of insectivorous birds, and on the other a large increase in the number of the few species that are known to be injurious. It is obvious that in the interests of agriculture, the former should receive every protection and encouragement, whilst against the latter a very firm repressive policy should be adopted.

The conditions which it is desirable to establish, and which should be ever borne in mind when considering protective or repressive measures, have been very succinctly summarised by the late Professor F. E. L. Beal, who writes (3)* :—" A

* The numbers in brackets refer to the numbers of the references in the Bibliography on p. 690.

careful examination of the circumstances in which birds have done harm leads to the belief that the damage is usually caused by an abnormal abundance of a species within a limited territory. In such cases so great is the demand for food that the natural supply is exhausted and the birds attack some of the products of garden or orchard.

"Economically considered, birds are simply natural forces, and it should be our purpose to ascertain how they may be turned to our greatest advantage. The best economic conditions are probably fulfilled when birds are numerous as species and moderately abundant as individuals. Under such conditions there will be a demand for food of many kinds, without excessive demand for any one kind. The most desirable status would seem to be such a relation of numbers and species between birds and insects that the birds would find plenty of food without preying upon useful products, while the insects would be held in such check that they would neither increase to a harmful extent nor be completely exterminated. The proper course to pursue, apparently, is to study the food habits of both birds and insects, to favour the increase of species which seem best adapted to preserve the proper balance, and to reduce the numbers of those that prey too greatly on the products of orchard or farm."

In other countries, where the study of this subject has reached a more intensive level, very stringent laws have been enacted, and the policy of protection for all species that are beneficial and the formulation of repressive measures for those that are injurious, has borne excellent fruit and more than justified the action of the State in maintaining its special departments for the study and investigation of this intricate problem.

That the problem is an intricate one few will deny, and the time has now arrived when individual expressions of opinion unsupported by facts, or investigations that take note of the food consumed in only particular months of the year, are no longer of service, for they rather hinder then help in arriving at a true estimate of the precise economic status that any particular species occupies.

Hasty generalisations on a subject presenting so many difficulties can only be productive of harm. As Mr. William Berry has recently, and very truly stated (4), "Newspapers teem with ill-informed letters and articles on this subject, and the remedial measures recommended would usually prove as futile as they are drastic."

In the past the subject has to a large extent been treated in a very casual and unscientific manner, and yet it is obvious that it is one that is vitally related to both agriculture and horticulture, and requires to be pursued along strictly scientific lines.

In my work on the food of certain British wild birds (9), published in 1913, I was able to treat of all but one of the species dealt with in the present investigation, but, unfortunately, the method of estimating the crop and stomach contents there adopted was that known as the numerical one, whereas the only one that affords scientific accuracy is that known as the volumetric method, and, with the exception of two species (the green woodpecker and the pheasant), is here used for the first time in this country in relation to the species treated of, nine species in all, which have been re-investigated during the intervening five years.

Hitherto some of these species have been condemned and others have wrongly been regarded as beneficial, but the evidence forthcoming is not convincing. In cases of this kind surely it is necessary, to use the words of Lord Kelvin, that we should be able to measure what we are speaking about and express it in numbers, otherwise our knowledge is of a meagre and unsatisfactory kind.

In the investigation now set forth, an attempt has been made to state in definite figures the actual percentages of the different kinds of food consumed by each species during a whole year.

The total number of adult specimens examined is 3,670, obtained during each month of the year, and 595 nestlings.

II.—METHODS.

Considerable controversy has taken place as to the value of the different methods employed for estimating the food contents of birds' stomachs. On the one hand we have the system of percentage valuation by bulk and on the other the numerical system. The former is that adopted by the United States Biological Survey, whilst the latter has been used by a few workers in the United States and almost entirely by British workers.

It is not necessary here to assert the superiority of the volumetric method over that of the numerical or gravimetric methods. The various objections that have been raised have been dealt with in a very able paper by McAtee (19). The reader who wishes to follow the subject further may consult this together with a paper by the writer (13).

Bryant (5) in his work on the Western meadowlark made an attempt to arrive at the average volume of food taken by this bird, by determining the volume of food contained in a large number of stomachs in cubic centimetres and taking an average volume. This allowed the recording of each stomach as being of average volume, over the average, or below the average.

The same writer so clearly and forcibly states the case for this combination, that I quote him at length. "Three methods," he writes, "may be used in estimating the quantity of food in a bird's stomach. First, the articles may be counted; second, they may be weighed; or third, they may be estimated by volume.

"The first method, although important as giving an idea of the bird's economic value by showing the number of injurious insects or seeds destroyed, fails to take into account the difference in size of the different articles, and does not show the relative amounts of each kind. The second method has been generally disregarded because of its impracticability. The third or volumetric method allows of a balance of the inequalities of size and best portrays 'the ratios each element bears to the others.'

"By the numerical method, 50 ants would be placed against, say, 6 ground beetles. A computation made by the percentage-by-volume method would doubtless show that these two kinds of food represented only 3 and 26 per cent., respectively, of the whole food. Hence the idea furnished in the first case (a ratio of 50 to 6) *is a misleading one. Numbers of one insect cannot* be balanced against the numbers of another insect. As each bird of the same species has a certain average stomach capacity, the ratio of each element to this average capacity gives the most accurate idea of the relative proportions of each kind of food."

In estimating the percentages of the different items of food I have followed the system in use at the United States Bureau of Biological Survey. The percentages have been estimated separately for each stomach contents in accordance with the ratio of each element to the total contents. The percentage of sand, gravel, etc., was first set down in relation to the gross contents, and the remaining food items then considered as 100 per cent. Empty or almost empty stomachs, or others for various reasons judged abnormal, have been rejected.

III.—SPECIES EXAMINED.

1.—MISSEL THRUSH (*Turdus viscivorus*, Linn.).

During recent years this species has increased very rapidly, particularly in the South, and is more and more becoming a fruit-eater. There is now ample evidence to show that for at least four months in the year it does considerable harm in fruit-growing districts.

Post-mortem Records.—Fifty-two specimens have been examined; Of the total food consumed during the year, animal food forms 55 per cent. and vegetable food 45 per cent. The greatest proportion of animal food is consumed in May and June, viz., 78·5 and 75·5 per cent. respectively. The various items are as follows :—30·5 per cent. consisted of injurious insects, 23·0 per cent. of which were beetles and beetle larvae, 5·0 per cent. the larvae of lepidoptera, and 2·5 per cent. of leather-jackets, crane flies and eggs of crane flies ; beneficial insects, mostly beetles and beetle larvae, were present to the extent of 4·5 per cent.; and 1·0 per cent. of neutral insects. Earthworms form a large proportion of the diet, constituting 14 per cent. for the year, the highest percentage being reached in April and May, which was 23·0 per cent. in both months; slugs and snails represent 3·5 per cent.; and miscellaneous animal matter, such as spiders, millipedes, etc., 1·5 per cent.

Of the 45 per cent. of vegetable food, wild fruits and seeds were present to the extent of 24·0 per cent., and 16·5 per cent. were certainly cultivated fruits, whilst the remaining 4·5 per cent. of miscellaneous vegetable matter consisted of grass, fragments of flowers, etc. (*Fig.* 1).

Summarising these figures we find that 35·5 per cent. of the total food consumed during a whole year is beneficial, 43·5 per cent. is neutral, and 21·0 per cent. is injurious (*Fig.* 2).

Food of Nestlings.—Only sixteen nestlings were examined The whole of the food consumed was of an animal nature, and consisted of 38·5 per cent. of lepidopterous larvae, 16·5 per cent. of coleopterous larvae and fragments of a few small beetles, 19·0 per cent. of diptera and dipterous larvae, 15·5 per cent. of earthworms, and 10·5 per cent. of slugs. Of the insect content, 72·0 per cent. consisted of injurious insects, and 1·0 per cent. of each neutral and beneficial insects.

Conclusion.—In spite of its depredations in fruit-orchards this bird must at present be regarded on the whole as beneficial, for the number of injurious insects and slugs that it destroys more than counterbalance the injuries it inflicts. I must frankly admit that my estimate in 1913 (9) was imperfect, when, judged by the numerical method of estimating its food, I wrote " For four months in the year it does more harm than is counterbalanced during the remainder of the year." The improved and more accurate method of estimating the nature of its food now shows that statement to be wrong, and I am glad to be able to correct it

Fruit growers in the South undoubtedly suffer much more from the activities of the Missel Thrush than growers in the more

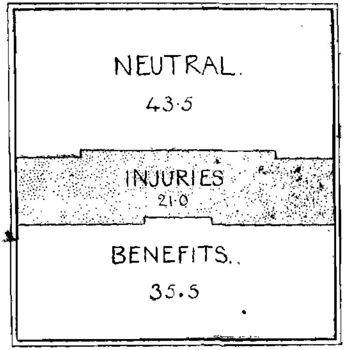

FIG. 2.—Diagram summarising Injuries, Benefits, etc., of the Missel Thrush.

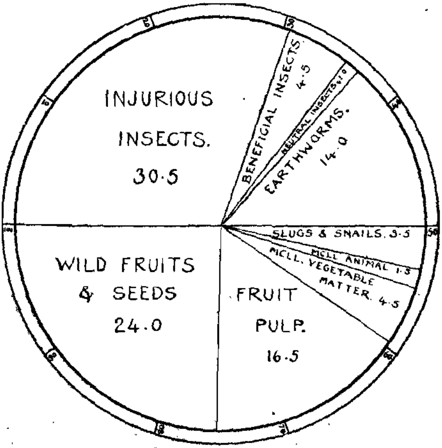

FIG. 1.—Diagrammatic Representation of the percentages of Food of the Missel Thrush.

northern parts of the country, for during the winter these birds migrate southwards, and, finding plenty of fruit trees, they remain there and cause considerable damage.

In certain localities the bird is undoubtedly too numerous, and in all probability a reasonable reduction is justifiable in such areas, but its general destruction would be a distinct economic loss to the country.

2.—HOUSE SPARROW (*Passer domesticus*, Linn.).

Sonnini, writing nearly a century ago, stated that sparrows lived "only in society with man, dividing with him his grain, his fruit, and his home; they attack the first fruit that ripens, the grain as it approaches maturity, and even that which has been stored in granaries."

"Its history," says Skinner (20), "begins with that of man, and it is referred to by Aristotle and many other European writers on natural history who followed him; in fact, there is reason for believing that it was known to people of whom we have no written history. When writing was invented the sparrow was selected for the hieroglyphic symbolising enemy, and proofs of its destructive habits have been cited by certain authors showing that it has been the enemy of mankind for more than five thousand years."

There is a very general, but entirely mistaken, opinion that the House Sparrow feeds largely upon insects. During the nesting season I have shown (10) that the food fed to the young birds, and in all probability most of that taken by the parents, consists mainly of insects, worms and slugs, but during the remainder of the year it is chiefly grain of some kind.

The late Professor C. V. Riley, the most eminent and experienced American economic entomologist of his day, was of opinion that this was "a destructive bird, worthless as an insect killer," while Judd (18) states "The English sparrow is the most highly granivorous bird on the farm. Grain . . . formed 86 per cent. of the food of the adults." Forbush (14) writes "Being a small bird, it necessarily eats many insects, but it lives more on grain and less on insects than any of the native birds that it supplants, and is one of the few species that deserves no consideration at the hands of the farmer." Skinner (20) remarks, "The house sparrow . . . has been known for ages as one of the worst of feathered pests." Gurney (16), Russell (16), Coues (16), Miller (16), Barrows (2), Ormerod and Tegetmeier (22) and many others have similarly condemned this bird.

The house sparrow is still with us and more numerous than ever, and its habits are the same as they were a hundred years ago. For 50 years at least the "sparrow question" has been debated in and out of season, and the bird has been condemned by practically every individual who has investigated its feeding habits. Its depredations are deplorable in the extreme, whilst the financial loss which it occasions amounts to some millions of pounds sterling per annum.

I have frequently expressed my opinion upon this bird and my only reason for including it in the present investigation is in order to give the results of an analysis of the food by the volumetric method.

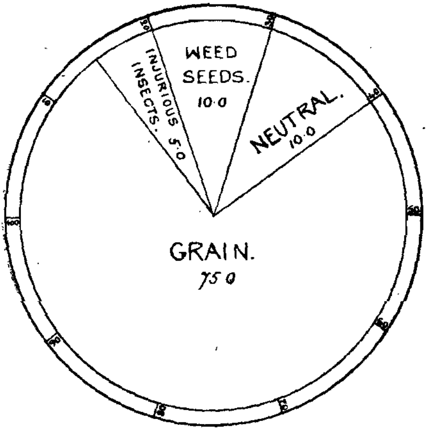

FIG. 3.—Diagrammatic Representation of the percentages of Food of the House Sparrow in Agricultural Districts.

Post-mortem Records.—Upwards of 1,200 specimens have been examined and these have been divided into three series, viz. :—

1. Adults from agricultural districts.
2. Adults from fruit-growing districts.
3. Nestling sparrows.

1. *From Agricultural Districts.*—The total animal food consumed during the year amounts to 10·0 per cent., and the total vegetable food to 90·0 per cent. Of the former 5·0 per cent. consists of injurious insects, and 5·0 per cent. of miscellaneous animal matter of a neutral

nature. Seventy-five per cent. of the vegetable matter is grain, 10.0 per cent. weed seeds, and 5·0 per cent. miscellaneous and of a neutral nature (*Fig.* 3).

2. *From Fruit-growing Districts.*—Animal food forms 40·0 per cent. of the total food consumed, and vegetable food 60·0 per cent. Nearly the whole of the animal matter consists of injurious insects and is of a varied character. Careful examination shows it to contain 0.5 per cent. of earwigs, 1·0 per cent. of hemiptera, 4·5 per cent. of coleoptera and their larvae, 23·5 per cent. of lepidopterous larvae, and 5·5 per cent. of diptera and dipterous larvae.

Of the vegetable matter grain constitutes 17 per cent., blossom buds, 9·0 per cent., weed seeds, 20·0 per cent., and miscellaneous vegetable matter (bread, rice, etc.) 14·0 per cent. (*Fig.* 4).

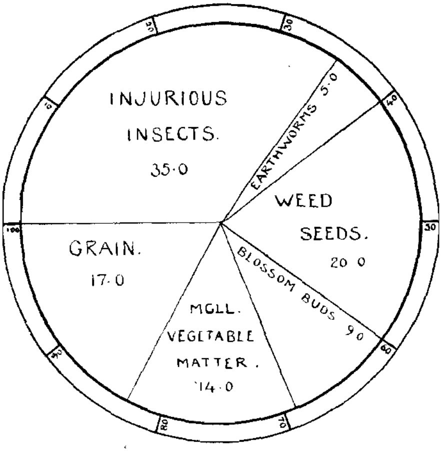

FIG. 4.—Diagrammatic Representation of the percentages of Food of the House Sparrow in Fruit-growing Districts.

In fruit-growing districts we may therefore say that 35·0 per cent. of the food is beneficial, 26·0 per cent. injurious, and 39·0 per cent. of a neutral character.

3. *Nestling Sparrows.*—Animal food forms 95·5 per cent., and vegetable food 4·5 per cent. of the food fed to the nestlings. I have elsewhere (10) given full details of the insects, etc., and their numbers for 287 nestlings, and those since examined are very similar (*Fig.* 5).

Conclusion.—In spite of all the benefits conferred by the nestlings I see no reason to alter an opinion expressed many years ago that this bird "has been allowed to increase to such an extent that it has become one of the worst pests we

have" and "at present the attitude of all farmers must be one of extermination."

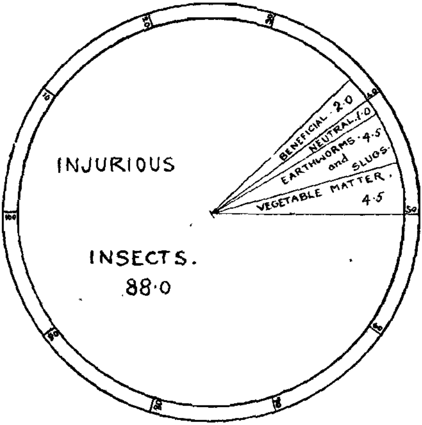

FIG. 5.—Diagrammatic Representation of the percentage of Food of Nestling House Sparrows.

3.—ROOK (*Corvus frugilegus*, Linn.).

The economic status of this species still remains a matter of controversy in spite of the many investigations that have been made of its feeding habits.

Year.	Cereals.	Potatoes & Roots.	Miscellaneous Vegetable Matter.	Seeds.	Insects. Injurious.	Insects. Beneficial.	Insects. Neutral.	Earthworms.	Slugs, Snails, and Millipedes.	Eggs, Field Mice, and Young Birds.	Total Animal Food.	Total Vegetable Food.
1913 ..	34·5	14·5	6·5	4·0	24·5	3·5	4·5	4·0	2·4	1·6	40·5	59·5
1914 ..	32·5	13·5	5·5	4·5	24·0	4·0	5·0	5·0	5·0	1·0	44·0	56·0
1915 ..	35·0	13·0	6·0	5·0	24·5	3·0	4·5	4·5	3·0	1·5	41·0	59·0
1916 ..	38·5	12·5	6·5	4·0	22·5	3·5	4·5	4·0	2·4	1·6	38·5	61·0
Averages	35·1	13·4	6·1	4·4	23·9	3·5	4·6	4·4	3·2	1·4	41·0	58·9

I have set forth in considerable detail the results of an investigation made in 1908-09 (6). Further work carried out during the past four years only serves to emphasise the fact that with the present abundance of this species it is much more harmful than beneficial.

A summary of the four years' work is shown in the table above, the stomach contents being estimated by the volumetric method.

The details of the various kinds of food have been frequently set forth. I have not thought it necessary, therefore, to schedule them again. Fig. 6 sufficiently indicates the percentages of the totals and averages.

All the evidence collected with reference to this species, *i.e.*, post-mortem examinations of the stomach contents and field observations, leaves no doubt as to the true economic position

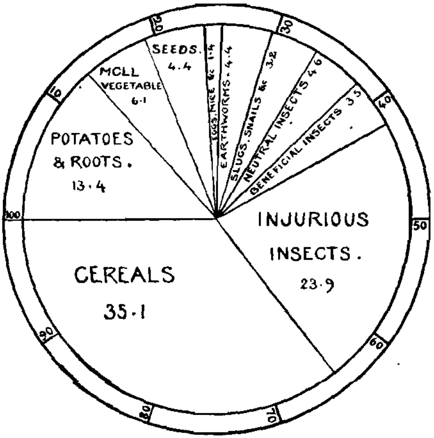

FIG. 6.—Diagrammatic Representation of the percentages of Food of the Rook.

t at present holds. Any policy of extermination or even general lestruction would, in my opinion, be a most short-sighted and unwise one on the part of agriculturists; at the same time easonable repressive measures are very desirable, for so long as rooks are as numerous as at present, they will continue to be a source of considerable harm to cereal and root crops.

4.—SKYLARK (*Alauda arvensis*, Linn.).

The Skylark has long occupied an ambiguous place as regards ts economic position. We know that it feeds largely upon njurious insects and their larvae and the seeds of weeds, but

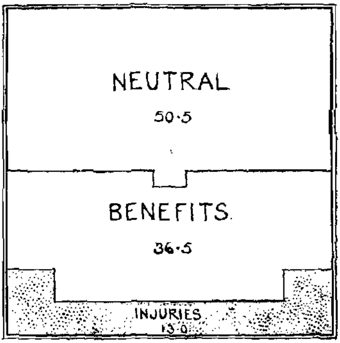

FIG. 8.—Diagram summarising Injuries, Benefits, etc., of the Skylark.

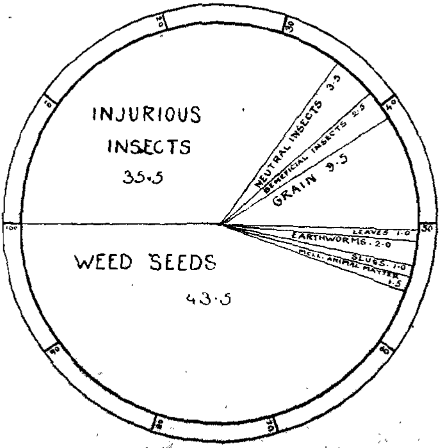

FIG. 7.—Diagrammatic Representation of the percentages

at the same time it has frequently been observed damaging autumn-sown wheat and other crops. What, however, has not been known was the exact proportion of its total food that was injurious, beneficial, or neutral. Hammond (17) in his investigation of the feeding habits of this species sums up as follows: "The bulk of the food consists of weed seeds; this is eked out in the summer months by insects, and in the winter by pieces of leaf, for the most part of crops. . . . the damage to leys and wheat is done for the most part by the migratory birds, but the damage to 'small seeds' is probably done by the birds breeding here. The conclusion reached is that, on the whole, the lark is beneficial; but, owing to the injuries done at certain seasons of the year, there is no reason why it should be specially protected, although its wholesale slaughter is to be deprecated."

The results obtained by the present investigation prove the skylark to be considerably more beneficial than injurious, the bulk of its food consisting of *weed seeds and injurious insects.*

Post-mortem Records.—Sixty-nine specimens have been examined, or an average of 5·75 for each month of the year.

Of the total food consumed in a year, animal food forms 46·0 per cent., and vegetable food 54·0 per cent. Of the former, 35·5 per cent. consists of injurious insects, 3·4 per cent. of neutral insects, and 2·5 per cent. of beneficial insects; earthworms constitute 2·0 per cent., slugs 1·0 per cent., and miscellaneous animal matter 1·5 per cent.

As already stated the vegetable food consists largely of weed seeds, the actual percentage being 43·5; of grain, there is 9·5 per cent., and leaves of crops 1·0 per cent. (*Fig.* 7).

A summary of these different items shows (*Fig.* 8) that 50·5 per cent. of the total food consumed is of a neutral nature, 36·5 per cent. beneficial, and only 13·0 per cent. injurious.

Food of Nestlings.—The nine nestlings examined showed that the whole of the food was of a beneficial character, consisting of caterpillars, aphids, and remains of beetles and their larvae, including wireworms.

Conclusion.—This volumetric analysis of the skylark's food no longer leaves us in doubt as to the true economic position it should occupy. The injuries it does by damaging seed corn and other crops are far outweighed by the benefits it confers in destroying injurious insects. Very truly has it been said that "in nearly all cases, the misdeeds of birds are much more manifest than the benefits they confer upon us."

No difficulty should be experienced in holding in check the migratory birds arriving in the autumn when found to be doing harm.

5.—GREEN WOODPECKER (*Gecinus viridis*, Linn.).

In 1915 I published a short report (11) upon the economic status of this species, and in view of the national importance

of forestry in this country, the precise position of so beneficial a bird cannot be too widely known.

Post-mortem Records.—The number of specimens examined was 78, and the whole of the food consumed throughout the year was of an animal nature. Injurious insects formed 75·0 per cent., 20·0 per cent. consisted of ants, and the remaining 5·0 per cent. was unidentifiable remains of insects, including a single ladybird beetle. There were also two spiders (*Fig.* 9).

Conclusion.—A species that destroys so large a percentage of injurious insects would need to have some very serious and proved shortcomings before we could regard it as injurious,

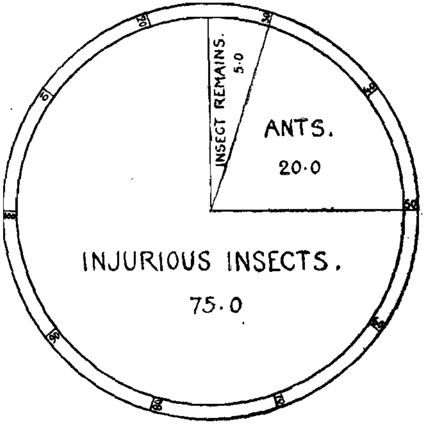

FIG. 9.—Diagrammatic Representation of the percentages of Food of the Green Woodpecker.

and observations made in all parts of the country, from 1913 to the present date, fully confirm the fact that trees which are sound are seldom, if ever, attacked by woodpeckers.

To my mind there can be no question as to the value of the woodpecker in relation to forestry, and it deserves every protection.

6.—SPARROW HAWK (*Accipiter nisus*, Linn.).

Writing many years ago Yarrell (23) very truly stated that this is "the only bird-of-prey which the game-preserver nowadays need fear."

I have elsewhere shown (12) that game-birds are exceedingly beneficial from the standpoint of the agriculturist, and we must, therefore, very carefully weigh and interpret the evidence forthcoming as to the economic position of the sparrow hawk. It has long enjoyed an unenviable reputation in the poultry-yard, and it is certainly not beloved by the gamekeeper.

Post-mortem Records.—One-hundred and nine specimens have been examined. The total food content for the year shows that 97·5 per cent. consists of animal food and 2·5 per cent. of vegetable food. Of the former, 16·5 per cent. consists of game-birds, 9·5 per cent. of poultry, 6·5 per cent. of ducklings, 4·5 per cent. of insectivorous birds, and 4·5 per cent. of beneficial insects, or a total of 41·5 per cent. of an injurious nature. Against this must be placed 19·5 per cent. of blackbirds, sparrows, and wood-pigeons, 15·0 per cent. of injurious insects, and 6.5 per cent. of mice, making a total percentage of benefits of 41 per cent. Neutral insects account for 5·5 per cent., and miscellaneous animal matter, 9·5 per cent. It was not possible to say whether this belonged to the injuries or benefits, so we have proportioned it, giving 5·5 per cent. to the former and 4·0 per cent. to the latter. There was also 2·5 per cent. of miscellaneous vegetable matter (*Fig.* 10).

Thus we have 47·0 per cent. of injuries, 45·0 per cent. of benefits and 8·0 per cent. of a neutral nature. (*Fig.* 11).

We have now to interpret these facts, or in other words consider the economic value of the different food items.

Whilst the destruction of such injurious birds as sparrows, wood-pigeons, and blackbirds is a point in the birds' favour, this item can scarcely be regarded as equivalent to a similar percentage of game-birds, poultry, young ducks, or insectivorous birds. Moreover, practically all of the latter group, excepting the insectivorous birds, were young birds or chicks, whereas, with the exception of a few wood-pigeons and blackbirds, all the former were adults. The loss or injury is therefore considerably in excess of the benefits, but not to the extent that is usually supposed. In the matter of insects 25·0 per cent. was found, but beneficial species formed 4·5 per cent., and neutral species 5·5 per cent., the actual injurious species amounting to only 15·0 per cent.

Conclusion.—After very carefully considering the above facts we are of opinion that the injuries this bird inflicts are considerably in excess of the benefits it confers, in consequence of which we cannot advocate any protection for it.

7.—KESTREL (*Falco tinnunculus*, Linn.).

On the assumption that all hawks are injurious, the Kestrel or Windhover has been persecuted for very many years, and in certain districts it has become fairly rare. Yet in spite of all that has been said and written against it, it is one of the most useful birds we have in its relation to agriculture. All who have investigated its feeding habits have been compelled to admit that the good it does far outweighs any harm it occasions during a very brief period of the year.

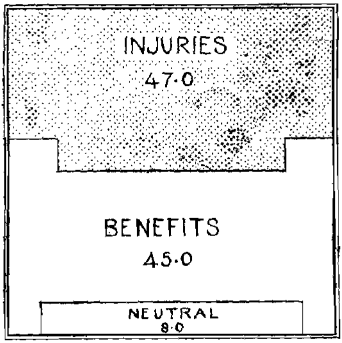

Fig. 11.—Diagram summarising Injuries, Benefits, etc., of the Sparrow Hawk.

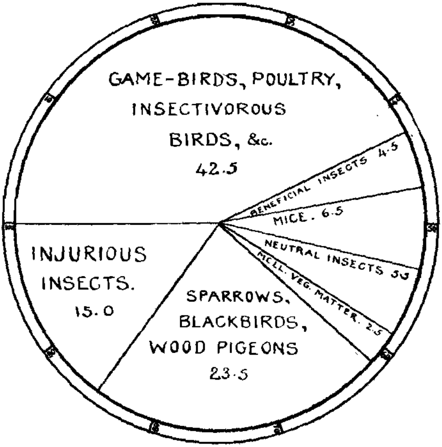

Fig. 10.—Diagrammatic Representation of the percentages of Food of the Sparrow Hawk.

Yarrell (23) states that mice form the principal part of its food, and that it appears to obtain them by dropping suddenly upon them. Montagu says "he never found any feathers in the stomach of this species; but it is certain that it does occasionally kill and devour small birds, and at times the young of larger ones. The remains of frogs, coleopterous insects, their larvae, and earthworms, have been found in their stomachs"; and Selby, on the authority of an eye-witness, has recorded the fact of the Kestrel hawking cockchafers late

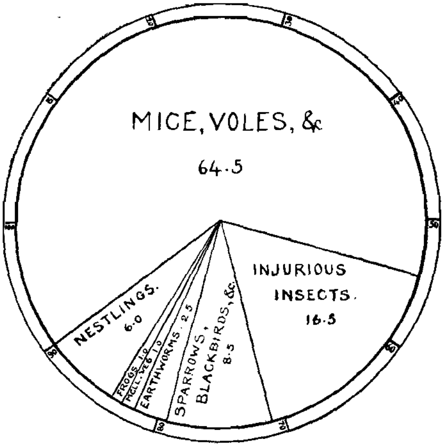

FIG. 12.—Diagrammatic Representation of the percentages of Food of the Kestrel.

in the evening. The observer watched the bird through a glass and "saw him dart through a swarm of the insects, seize one in each claw, and eat them while flying. He returned to the charge again and again. I ascertained it beyond doubt, as I afterwards shot him."

Archibald (1) has drawn attention to three facts about kestrels which should not be lost sight of, viz., "The first is that they very frequently bring up their young within easy reach of hand-reared game without taking a single chick, but, notwithstanding the temptation, continue to lead a life of harmless utility. Secondly, it is only during a very brief period

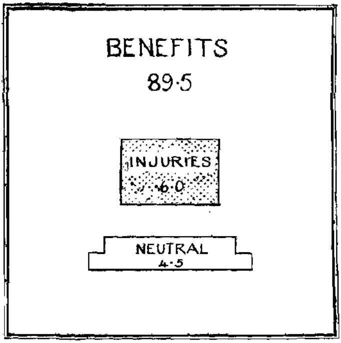

FIG. 13.—Diagram summarising Injuries, Benefits, etc., of the Kestrel.

of the game-birds' existence that any danger need be apprehended from the windhover, for it will not touch them except during their helpless infancy. Thirdly, throughout the rest of the year the kestrel does incalculable and unmixed good, by the destruction of hosts of field-mice and injurious beetles. The value of farm produce thus saved from destruction is almost beyond estimation. It is, therefore, a short-sighted policy to exterminate such beautiful and useful birds because they do a certain amount of harm, that harm being confined to a very few weeks in the year."

Post-mortem Records.—An examination of the stomach contents of 80 specimens shows that animal food forms 99 per cent. of the total food consumed during the year, and vegetable food 1·0 per cent. only. Of the former 64·5 per cent. consists of mice and voles, 8·5 per cent. of sparrows, blackbirds, and thrushes, 6·0 per cent. of nestling birds, 16·5 per cent. of injurious insects, 2·5 per cent. of earthworms, and 1·0 per cent. of frogs (*Fig.* 12).

The only portion of this food that can possibly be placed against the kestrel is the 6·0 per cent. of nestlings, part of which consisted of game-birds. The remaining 89·5 per cent. is all in its favour, and 4·5 per cent. is of a neutral nature (*Fig.* 13).

The injuries occasioned by mice and voles are only too well known to need comment, but the total loss in food products and that due to damage must be considerable.

The damage done to young game-birds is trivial, when one considers the nature of the remaining food. Indeed, supposing the kestrel destroyed no mice or voles and obtained this 64·5 per cent. of food from

neutral animal and vegetable matter, it would still be a valuable bird and worthy of protection, for it destroys 16·5 per cent. of injurious insects (mostly beetles, beetle larvae, and the caterpillars of certain Noctuid moths, such as the "Cabbage," the "Heart and Dart," and "Turnip Dart.") In addition to these it takes a certain toll of sparrows and blackbirds.

Conclusion.—Whilst no one wishes to see the ancient game laws, which protected the Kestrel, revived, it is a bird certainly deserving of very strict protection; and if certain individuals will persist in destroying a species that is so beneficial, they should be compelled to pay dearly for their foolishness.

8.—WOOD PIGEON (*Columba palumbus*, Linn.).

The Wood Pigeon has long been known as an injurious species, but from time to time there are those who will vigorously defend it, as if it were a friend rather than a foe to the agriculturist. This attitude invariably arises from an imperfect knowledge of the feeding habits of this species. An examination of the crop contents of a bird shot in May or June, or indeed in any odd month of the year, but very imperfectly indicates the nature of the food throughout the year; and

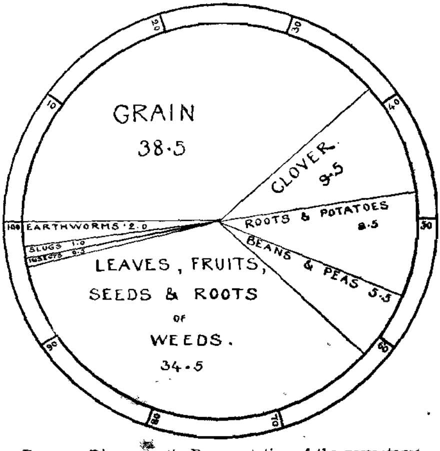

FIG. 14.—Diagrammatic Representation of the percentages of Food of the Wood Pigeon.

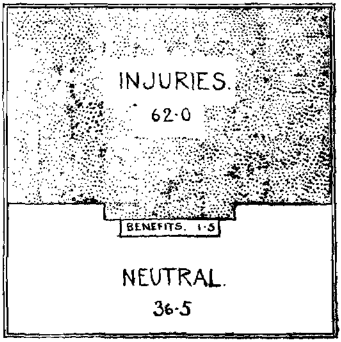

FIG. 15.—Diagram summarising Injuries, Benefits, etc., of the Wood Pigeon.

certainly gives no idea as to the ratio which one item of food bears to another. In one case such an examination might lead one to suppose that the species was very beneficial, whereas it might be a most injurious one, and in regard to another might lead us to condemn an undoubtedly beneficial species.

Post-mortem Records.—The stomachs and crops of 428 specimens have been examined. Of the total food content for the whole year 96·5 per cent. consisted of vegetable food and 3·5 per cent. of animal food. Of the former 38·5 per cent. was composed of grain, viz., 16·5 per cent. of barley, 12·5 per cent. of wheat, 8·0 per cent. of oats, and 1·5 per cent. of rye. Clover constituted 9·5 per cent. of the total food content, roots and potatoes 8·5 per cent. and beans and peas 5·5 per cent. Fruits, seeds, leaves and roots of weeds and various plants and grass represented 34·5 per cent. Of the animal matter, earthworms accounted for 2·0 per cent., slugs and snails 1·0 per cent., and fragments of insects 0·5 per cent. (*Fig.* 14). In other words, 62·0 per cent. of the food was injurious to agriculture, 36·5 per cent. of a neutral nature, and only 1·5 per cent. beneficial (*Fig.* 15).

Let us proceed to interpret these figures. Assuming that a Wood Pigeon requires on an average about 2½ oz. of food per day or 57 lb. per year, then, according to the percentages of the total food bulk consumed in a year, it would roughly eat 35½ lb. of grain, clover, roots and pulse, 20½ lb. of weeds, grass, earthworms, etc., and about 1 lb. of slugs, snails, and insects. Taking the injurious element as of the first importance, 100,000 birds would consume nearly 1,584 tons of such food in a year.

Yarrell informs us that in East Lothian between 1863 and 1870 over 130,000 birds were shot without materially affecting its numbers.

From all parts of the country we hear of flocks varying from 5,000 to 20,000. What the total census for the United Kingdom must be it is difficult to say, but the number must be a very large one.

There can be no question as to the economic position this bird occupies, and every means should be taken to destroy it.

9.—LAPWING (*Vanellus vulgaris*, Bechst.).

I have previously dwelt upon the apathetic indifference displayed by agriculturists towards this species (9), but its fate must not be permitted to rest in their hands, unless we wish to see its numbers gradually but surely reduced. It would be impossible to overestimate its value to agriculture.

Post-mortem Records.—Sixty-nine specimens have been examined. Of the total food content consumed during the year 89·0 per cent. is animal food and 11·0 per cent. vegetable food. Of the former, injurious insects form 60·0 per cent., neutral insects 4·0 per cent., slugs and snails 10·0 per cent., earthworms 10·0 per cent. and miscellaneous animal matter of a neutral nature 5·0 per cent. Six per cent. of the vegetable food consists of weed seeds and 5.0 per cent. of miscellaneous vegetable matter. Thus 70·0 per cent. of the food is of a beneficial nature and 30·0 per cent. neutral (*Figs.* 16 and 17).

The three chief items constituting the insect food are wireworms, beetles and beetle larvae, and leather jackets.

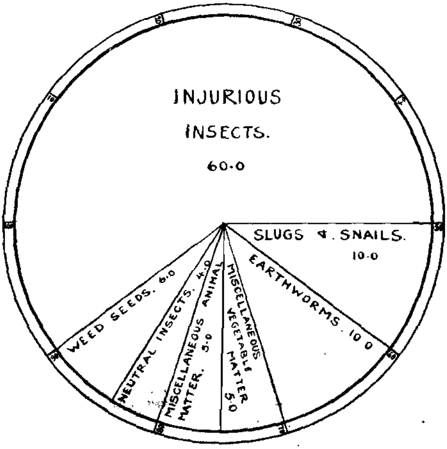

FIG. 16.—Diagrammatic Representation of the percentages of Food of the Lapwing.

Conclusion.—For some years to come the taking or killing of the birds or the eggs should be prohibited throughout the year

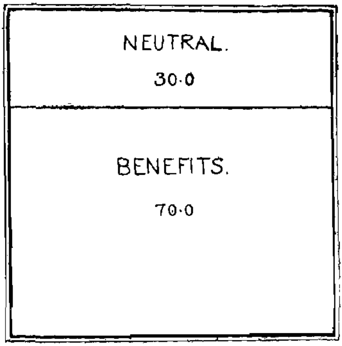

FIG. 17.—Diagram summarising Benefits, etc., of the Lapwing.

IV.—SUMMARY AND CONCLUSION.

As the result of an examination of the stomach (and crop, where present) contents of 3,670 adult birds and 595 nestlings, embracing nine species of wild birds, we are of opinion :—

1. That the volumetric method or percentage by bulk is the only reliable one for estimating the nature of the food and a bird's true economic position.

2. That the numerical method is highly misleading and unsatisfactory.

3. That of the nine species of wild birds treated—
   - *a.* Two are distinctly injurious, viz., the House Sparrow and the Wood Pigeon.
   - *b.* Two are too numerous, and consequently injurious, viz., the Rook and the Sparrow Hawk.
   - *c.* One is locally too numerous, viz., the Missel Thrush.
   - *d.* Four are highly beneficial, viz., the Skylark, the Green Woodpecker, the Kestrel, and the Lapwing.

4. That in the interests of agriculture it is very desirable that strong repressive measures be taken against the species mentioned in section *a*, and for the time being all protection withheld from those species mentioned in sections *b* and *c*, whilst every protection should be given to the four species mentioned in section *d*.

5. Finally, as a result of this investigation, we are of opinion that all of the commoner species of wild birds require re-investigating so far as their food and feeding habits are concerned, and their various food items worked out and estimated by the volumetric method.

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REGULATIONS AFFECTING THE REARING, FEEDING AND DISPOSAL OF HORSES.

Sale and Purchase of Horses: Sale of Horses Order, 1917.—The occupier of an agricultural holding may not sell or part with the possession of any horse which is used or is capable of being used for the cultivation of the holding, except with the authority of a licence.

A farmer who wishes to sell or transfer a horse which is not required by him for work on his farm, should make application to the Agricultural Executive Committee of the county in which his holding is situated for the necessary licence.

Such licences will only be granted in cases in which the County Executive are satisfied that the horse is surplus to the requirements of the holding, and the licences may contain such conditions as the Committee think desirable.

A farmer who wishes to purchase a horse for the cultivation of his holding, does not require a licence to purchase, but in his own interests should satisfy himself that the animal he proposes to buy, if coming from an agricultural holding, has been duly licensed for sale and that the conditions of the licence are complied with.

By the Horses Order, 1918, the Controller of Horse Transport is given the power of taking possession on behalf of the Board of Trade of any horse which is not being used wholly or mainly in agriculture, either absolutely, or by way of hire subject to such terms, other than compensation, as he may direct.

Purchase of Feeding Stuffs.—Priority certificates are now issued for horses engaged in agricultural work, and application

for such certificates, if required, should be made to the Live Stock Commissioner of the area in which the applicant resides.

Restrictions in the Use of Feeding Stuffs.—All horses (includes mares, geldings, colts, fillies, ponies and mules) are allowed the free use of roots, grass and green forage crops. Horses may only be fed with feeding stuffs of a cereal nature unfit for human food (grains, beans, peas, and products thereof), and hay, straw and chaff in strict accordance with the scale of rations laid down below. It is a penal offence to exceed the scale of rations allowed.

It is forbidden to feed horses, or allow horses to feed on growing crops of wheat, barley, oats, and dredge corn in such a way as to prevent the crop reaching maturity. The restriction here given does not apply to winter sown barley.

The use of straw for bedding purposes is also forbidden. Oat straw, in particular, may only be used for feeding purposes. All horse chaff mixtures must be sold by weight, must contain not more than two-thirds by weight of chaff, and such chaff must not contain more than four-fifths of its weight of hay.

Necessity of Adopting a Scale of Rations for Farm Horses.—Although horses used specifically for agricultural purposes are exempt from the operation of the Rationing of Horses Order, it is strongly urged upon all owners of farm horses to adopt the scale of rationing as laid down for heavy working horses. The allowance given will be quite ample for the horses' needs, and horses so rationed will keep in good condition and carry out their work quite efficiently. The serious shortage of feeding stuffs renders such a course imperative, as unless the farmer adopts a scale of rations for his own horses there will not be enough feeding stuffs left over to supply the needs of the town horse and pit pony.

Keeping of Records by Horse Owners.—All persons owning horses entitled to limited rations of hay, straw, chaff and cereal feeding stuffs must keep a record in writing showing :—

(*a*) In the case of hay, straw or chaff :—

1. The number and classes of horses entitled to a ration.
2. The total maximum daily ration authorised by the Order.
3. The description and quantities of hay, straw and chaff fed to such horses each week.
4. The description and quantities of all hay, straw and chaff purchased and the date of purchase.

(*b*) In the case of cereal feeding stuffs :—

1. The number and classes of horses entitled to a ration.
2. The total maximum daily ration authorised by the Order.

3. The description and quantities of cereal feeding stuffs fed to such horses each week.
4. The description and quantities of all cereal feeding stuffs purchased to the date of purchase.

NOTE.—For the purposes of the above records the following quantities of other feeding stuffs shall be regarded as equivalent to 10 lb. of oats: maize $7\frac{1}{2}$ lb.; beans or peas 9 lb.; dried brewers' grains 12 lb.; bran 13 lb.

Maximum Daily Rations allowed to Horses.—

Cereal Feeding Stuffs in Terms of Oats.

Class of Horse.	In hard and continuous work.	When not in hard and continuous work.	Hay and Straw or Chaff.
1. Horses used exclusively or mainly for agricultural purposes	Excluded from the operation of the Orders.		
2. Stallions used exclusively for stud purposes ..	Excluded from the operation of the Orders.		
3. Horses in the possession of, or used exclusively for the purposes of, the Army Council, the Air Board, and the Admiralty	Excluded from the operation of the Orders.		
4. Horses used solely or mainly for trade or business purposes :—			
a. Heavy dray and cart horses and trotting vanners	14 lb.	10 lb.	16 lb.
b. Light draught horses and light trotting vanners	12 „	8 „	14 „
c. Other light horses and cobs	9 „	6 „	9 „
d. Ponies 14 hands and under	5 „	3 „	7 „
5. Horses not used for trade or business purposes :—			
a. Brood mares	7 lb.	Excluded from the operation of the Hay and Straw Order. Amounts to be fed left to the discretion of the owner.	
b. Weaned foals	6 „		
c. Yearlings :—			
1st Jan. to 31st May	6 „		
1st June to 31st Aug.	3 „		
1st Sept. to 31st Dec.	6 „		
d. Racehorses (registered for rations).	13 lb.		8 lb.
6. All horses not specifically mentioned above (horses used for pleasure, hunters, carriage horses, hacks, polo ponies, etc.)	No provision is made for these horses. Feeding cereal stuffs to such horses is forbidden and constitutes a penal offence.		Rationed for hay and straw as for similar class of horse used for trade or business purposes.

Orders on which the above Information is Based.—The Sale of Horses Order, 1917, No. 559; the Horses Order, 1918, No.

335; the Hay and Straw Order, 1918, No. 631; the Horse and Poultry Mixtures Order, 1917, No. 1173; the Growing Grain Crops Order, 1918, No. 402; the Cattle Feeding Stuffs (Priority Supply) Order, 1918, No. 7; the Horses Rationing Order, 1918, No. 410; and an Army Council Order dated 9th May, 1917.

(This article is also issued as Leaflet No. 9 of the Joint Committee of the Board of Agriculture and the Ministry of Food. Copies may be obtained free and post free on application to the Secretary, Joint Committee, Board of Agriculture and Ministry of Food, 6A, Dean's Yard, Westminster, S.W. 1.)

POULTRY ON ALLOTMENTS AND GARDEN PLOTS.

Under Orders made by the Food Controller the use for the feeding of Animals and Poultry of wheat, rye, barley, rice and dredge corn which are fit for manufacture into flour for human food is prohibited.

By paying special attention to the management of their poultry, cottagers, allotment holders and others may increase the home production of food, with profit to themselves and advantage to the nation.

A great many people could keep a few fowls for egg production who do not. By feeding surplus garden stuff, and scraps of "waste" food from their own and neighbours' kitchens to their fowls, householders can reduce their bills for poultry food. With proper housing and systematic management, laying hens give a profitable return for the cost of their keep and the small amount of time and attention which is necessary.

The following notes are of a general character. More detailed information on particular points is given in the various leaflets on poultry keeping issued by the Board.

Suggestions.—1. Under present conditions poultry-keepers will best serve the national interest by producing *eggs* rather than table poultry, for two reasons: (*a*) because the shortage is more keenly felt in regard to eggs than table fowls, as the country is more dependent upon imported eggs than upon imported poultry; and (*b*) because foodstuffs can be employed to greater advantage in the production of human food in other directions than in rearing purely table poultry.

2. To obtain the maximum number of eggs, fowls should not be kept beyond the end of their second laying season. It is

better to replace the stock every other season than to mix hens and pullets, this practice often proving more economical than securing fresh pullets each year.

3. Only hens which have laid well as pullets should be used for breeding purposes. It is even more important to use a cock from a good laying strain.

4. Eggs for hatching should always be from well-matured stock at liberty or in very large runs.

5. A male bird is unnecessary in most small yards; better stock can be obtained at a cheaper rate by the purchase of sittings each year from a reliable breeder, than by using home-produced eggs.

6. Hatching should not be later than March for the heavier and April for the lighter breeds.

7. It is important that whether chickens are reared naturally or artificially they should be given fresh ground and be kept apart from the older birds, or they will be liable to disease, or fail to make satisfactory growth.

8. It is better to purchase pullets in the autumn rather than to attempt to rear them when the ground available is limited.

9. Cockerels not required for breeding should be sold as soon after their sex is distinguishable as possible. Old hens and superfluous cocks should also be sold. Room will thus be left for the more productive stock, and the food bill will be reduced.

10. Care should be taken not to overstock the ground available for these purposes. Half-a-dozen hens may often be profitably kept on a small area, say, 120 sq. ft., whereas double the number would involve loss. Overcrowding is not good management.

11. If knowledge of poultry-keeping is limited, only a few birds should be kept at first. As experience is gained, the stock of poultry may be increased.

Suitable Classes of Poultry.—For occupiers of allotments and gardens fowls are the most suitable kind of poultry to keep.

Residents near open land such as commons should breed runner ducks or geese. Where there is plenty of rough grazing these birds are profitable, as they forage for the greater part of their food, and are naturally grazers. Ducks, geese and turkeys are unsuitable for allotments and gardens.

Area of Land Required for Poultry.—Poultry are more healthy and prodnctive with an open run, however small this may

be, and the number kept must be determined by the area available. For permanent occupation 50 fowls per acre may be regarded as sufficient. The occupier of an allotment with a good building may keep as many as 100 fowls on a ¼ of an acre, provided he is a skilful manager of poultry, but at the end of a year the ground should be vacated and cropped. Such a practice will only be successful in skilled hands.

From 6 to 12 hens should be the number generally kept on small runs by the garden poultry-keeper who can use an area of from 36 to 150 sq. yd. Half-a-dozen hens can be kept upon a plot 20 ft. by 6 ft., provided the soil is frequently dug over and renewed by fresh earth. In any case the ground should be kept as sweet as possible by sweeping, turning over and renewing the soil in small runs.

How to Use the Ground.—Apart from the danger of disease, poultry will not thrive upon tainted soil. Results will be less good each year of the occupation of one spot which is at all heavily stocked, unless constant labour and attention to the soil are exercised.

By far the best plan is to divide the ground into 2, 3 or 4 parts, and use each plot in succession for the birds, while the ground unoccupied is fully cultivated and cropped.

The manure on the parts successively vacated will largely increase the crops grown if the ground is suitably cultivated.

Only laying hens should be kept upon the part devoted exclusively to poultry. If chickens are reared they may be placed upon another section, but should on no account be reared in the pen with the hens, since this practice makes it impossible to obtain the best results from either the hens or chickens.

House and Runs.*—Upon allotments and gardens where it is necessary to confine birds in wire runs, the runs should be so erected that they may readily be moved to fresh ground. The wire may be fastened to posts with wire nails bent over rather than with staples; this will facilitate removal by unhooking, and will result in less damage to the netting.

The simple form of house is best, but it is always worth while to provide sufficient cover to afford a dry scratching shed in addition to the roost. The roost and shelter may be combined as one compartment or be separate, each method having certain advantages, and it is largely a question of the material and site available as to which it is better to adopt.

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* See also Leaflet No. 294 (*Poultry Houses and Appliances for Allotment Holders, Cottagers and Others*).

Where garden walls can be utilised to form part of the building it is usually preferable to have two separate compartments, especially if the run is limited, while a building of the combined type is better in the open, where there is more freedom for the birds.

The house with a shelter below is not to be recommended, as it involves lack of light and air, and is not convenient for cleaning the shelter, which is generally of little use as a scratching shed, and only utilised by the birds for dusting purposes.

A combined house, 7 ft. by 8 ft. with an average height of 5 ft., is a most suitable size for 12 to 15 birds. The open-fronted type is generally to be recommended, but in order to get the full benefit of the light with this facing S. or S.E., and without the disadvantages from driving rain in dull weather when the shelter is necessarily more often used, not more than 2 ft. of the front should be boarded up. This necessitates 18 in. to 2 ft. of glass, and a narrow hood at the top in order to keep out the wet and allow sufficient light. Less expensive glass, such as "hammered plate" serves the purpose better than canvas shelters and screens, which are often recommended, but are less durable and in the end are more expensive.

In a house already constructed and faulty in this respect, a top light will frequently improve matters.

The perches are best placed across the back of the house with a dropping board beneath, 2 ft. above the floor. Nest boxes placed so that only a dim light shows the interior, and preferably raised above the floor, prevent the risk of the evil habit of "egg eating."

A dry floor is essential, damp earth or litter in the house being a great deterrent to egg production.

When the house and shelter are in separate compartments, they should always be so constructed that the birds have access from one to the other without having to pass into the open. The trap door between may then be left open, and the birds are enabled to be down scratching in the early morning without being exposed to inclement weather. In the roost 2 sq. ft. per bird is sufficient area, and in the scratching shelter not less than 4 sq. ft. per bird.

It is essential that light should be given in the roost, and both house and shelter should be ventilated to keep the building sweet and airy without a direct draught beneath the birds when perching.

Existing sheds can often, with slight alterations, be well adapted for poultry, and no special type need be strictly adhered to if the principles of light, air and cleanliness are followed.

Hints for Practical Management.—Success in egg production is as much due to good management as to prolific stock.

Cleanliness is one of the most important factors and should be practised in regard to the house, the bird, and the food and water. A little thought and ingenuity will evolve methods securing the desired end with the minimum of labour.

Parasites.—There should be no red mite or hen fleas in properly-kept houses, and lice on the fowls can be kept down by rubbing sulphur into the feathers in spring and summer, and providing facilities for a dust bath.

Light and Ventilation.—The value of ample light in the shed cannot be overestimated, and if the house is well ventilated the birds will keep bright and healthy.

Exercise.—Exercise induced by keeping the birds well occupied is of great importance. Several inches of dry litter should be kept on the floor of the scratching shed. It should be of a light nature, such as straw chaff, dry leaves or bracken, in which the corn given is scattered for the birds to seek; the burying of grain in soil or the use of material of a heavy nature for the birds to turn over is a mistake often made. Such heavy work is not conducive to a large egg yield, although for breeding stock it is good to keep the fowls in hardy, muscular condition.

Feeding.—Plenty of fresh green food, shell and grit, have great effect in increasing egg production. Green food, unless chopped into small pieces, is best suspended to enable the birds to peck pieces off more readily; stale stumps and leaves should not be allowed to lie about. Odd scraps of flesh or fish, *e.g.*, rabbit offal or fish skins, are valuable food, and should be saved and given after cooking; there is little fear of over feeding an active type of fowl if the food given is of a correct nature to meet the bird's requirements.

Advice.—At the present time advice as to the selection, housing, and management of poultry is likely to be especially useful. In counties where an Inspector in Poultry Keeping has been appointed application for his advice and assistance should be made through the Agricultural Organiser or through the Secretary of the County Education Committee.

(This article is also issued as Leaflet No. 310, revised in August.)

Notes on Poultry Feeding.
(From the Harper Adams Agricultural College, Newport, Salop.)

THE difficulty of obtaining suitable feeding stuffs has become more intense and may be expected to remain so at least until the harvest is secured, when supplies of tail corn will again be available, though possibly in limited quantity. The past quarter has been characterised by shortage, not only of suitable grain for feeding, but also of suitable and adequate supplies of offals for mash feeding. This has resulted in a very considerable rise in price of those cereals or cereal products that are obtainable and not prohibited for poultry feeding—maize meal, for example, is now 25*s.* per cwt. as against 22*s.* at the date of the last quarterly report.

Owing to its price clover meal still offers attractions as a mash ingredient for the poultry keeper, provided that the sample is of good quality, for, unfortunately, no recognised standard of quality for this material yet exists.

Realising the seriousness of the shortage of millers' offals which have formed the basis of mash feeds, a feeding test of bulk foods from new sources has been made at the College with some success. While it was not found possible to maintain egg production at the high standard that it was possible to achieve with a pre-war ration, that experiment showed that it is possible to substitute some of the sharps or bran—both of which contain a fair proportion of fibre—for some readily procurable bulk food of vegetable origin.

Quite the most promising results were obtained with bracken feed, which possesses the advantage of being abundant in many parts of the country that are often ideal for poultry stock. Growing, as it does, in a dense mass, it is collected with a minimum of labour, and with normal weather conditions it is easily sun- or air-dried.

Analyses have shown the importance of properly sieving the material to remove the coarser portions of the fronds, in which the fibre content is much higher than in the finer portions.

Further work is in progress which has for its object the determination of the best time for cutting the bracken. From the results obtained it is found to be advisable to cut early before the centre stems become hard, and, though the loss in weight during drying is greater, the lower percentage of indigestible fibre more than compensates for this loss. In bracken cut young, the quantity of such fibre will amount to about 10 per cent. after milling and sifting, as against 40 to 50 per cent. in the mature fern. The young fern does not contain the amount of dust that is to be met with in the older bracken.

The bracken after cutting should be sun-dried, turned, and handled just as clover hay, and the greener it can be stacked (provided it is thoroughly dried) the better the resulting sample. It should be carefully stacked and thatched and allowed to remain for a little time before being chaffed and put through any form of grinding mill.

A sifted sample of such meal has the following composition:—dry matter, 87 per cent., containing albuminoids, 5·65; carbohydrates, 58·8; oil, 2·9; and ash 7·8 per cent., as compared with clover meal, albuminoids, 14·4; carbohydrates, 42·6; oil, 2·6; and ash, 10·5.

A suitable ration would be: bracken meal 2 parts, fish meal 1 part, sharps 4 parts. In using the bracken meal it is advisable to scald it well and use the other meals of the mixture to dry off.

At this time of the year vegetables are abundant and the utmost use should be made of all waste produce. Mixed pig meals are still obtainable in parts of the country and may well be used as the basis of the mixture where very small quantities of other foodstuffs can be bought. As an example of a useful mixture the following may serve:—

Pig meal	3 parts.
Maize meal	1 part.
Sharps	1 „
Bran or clover meal, or bracken meal ..	1 „
Fish or meat meal	1 „
Vegetables	—

In using such a mixture the best results will be obtained where the grain fed can approximate to from a half to an equal weight of the mash.

Experiment on Cheap Feeding of Laying Hens.

THE following Notes of an interesting experiment, made under unfavourable conditions, of the cheap feeding of laying hens have been communicated to the Board by a correspondent:—

"*No grain or grain product whatever was fed to the hens during the 4½-months tests.* The food was a vegetable waste, say cabbage, 2 parts; carrots, turnips, and onions, together, 1 part; potatoes 6 parts, plus 1 part fish meal, fed as boiled. A cabbage to peck at was occasionally hung up.

The food ratio was kept as nearly 1 to 3 as possible and tested by analysis occasionally.

The hens were kept under ordinary backyard conditions and no grass surface was available. Comfortable but inexpensive accommodation was provided for roosting and a small covered area for scratching, the balance of yard surface being gravel or ashes. The health of the hens has distinctly improved during the period of the test.

On 14th February, two hens—A and B—were purchased from a local dealer at a cost of 7*s.* each, understood to be on sale for killing

purposes, and a third hen, C, was given for test purposes, free of cost, by a friend who was hopeless of getting eggs from her.

Hen A, which was of the White Wyandotte type, though possibly not pure, started to lay on the 9th March, and during the month of March gave 18 eggs, missing on the 10th, 12th, 14th, 19th and 25th. In April she gave 24 eggs, missing on the 4th, 9th, 14th, 19th, 20th and 23rd, while in May she gave 26 eggs, missing on the 4th, 14th, 21st, 25th and 30th. In June she gave 22 eggs, missing on the 4th, 8th, 12th, 16th, 19th, 23rd, 26th and 29th.

Her weight has varied a few ounces down, and latterly up again to her original weight.

Hen B, mongrel type, started to lay on the 16th March and gave 12 eggs, missing on the 17th, 20th and 24th. In April she gave 15 eggs and was broody from the 6th to the 19th inclusive and missing on the 28th. In May she gave 11 eggs, missing on the 1st and 30th, and being broody from the 9th to the 26th inclusive. In June she gave 17 eggs, missing on the 29th and 30th, and being broody from the 8th to the 16th inclusive.

Hen C, mongrel type, was in poor condition and when she came had every appearance of liver trouble. She gave two eggs only in April, one on the 20th and one on the 30th. In May she gave 25 eggs, missing on the 3rd, 9th, 13th, 19th, 23rd and 30th, and in June she gave 22 eggs, missing on the 8th, 13th, 17th, 18th, 22nd, 24th, 27th and 30th.

Some Wyandotte chickens which had been reared to three months old on corn and soft mash have, for the past month, been fed on the same mixture of waste vegetable material with fish meal, and on weighing the cockerels on 1st July, they averaged 3¾ lb., the pullets averaging 2½ lb., and all appear to be in excellent growing condition."

War Foods for Live Stock.

Uses for Fish Meal.—The value of fish meal as food for stock was hardly realised in this country before the War, and practically the whole production, some 30,000 tons, was exported to Germany, where it was much appreciated as a pig food. In point of fact, fish meal is a highly-concentrated food, the albuminous content of which makes it particularly valuable at the present time, when imported concentrated food is scarce. It should be given in small quantities, as an adjunct to foods in which carbohydrates predominate. The quantities which can be given to stock were stated in a special leaflet (No. 8*) issued by the Board of Agriculture some time ago as follows: pigs ¼ to ½ lb. per day; cattle 2 lb. for every 1,000 lb. live weight; sheep 1–10th to 1–5th lb. for every 100 lb. live weight; chickens not more than 5 per cent. of total food. The high albuminous content of fish meal, as compared with other feeding stuffs, is shown in the following table:—

	Per Cent. Digestible. Protein.	Fat.	Carbo-hydrates.	*Food Value, Taking Linseed Cake at* 100.
Ground nut cake ..	45·2	6·3	21·1	102
Linseed cake	26·7	9·3	30·1	100
Rice meal	6·8	10·2	38·2	90
Brewers' grain, wet ..	3·5	1·5	8·6	17
Feeding barley ..	8·0	2·1	57·8	89
Fish meal	54·0	4·0	—	78

Fish meal is being used increasingly for pig and poultry feeding; but there has been some hesitation about its use for other stock, partly

* This leaflet is no longer issued.

on the ground that it contains a quantity of salt, and, in the case of dairy cattle, because it was believed that the milk might be tainted. Experience goes to show that, in cases where the milk has been found to be tainted in fact, this has been due not to consumption of the meal, but to contamination from the hands of cowmen who handled the meal and also acted as milkers. An excessive amount of salt is a serious consideration, and the point is now being met by the Association of Fish Meal, Fish Guano and Fish Oil Manufacturers, who have decided to standardise a meal made from white fish and white fish offal without any admixture of herring material. The constituents are to conform to the following analysis: albuminoids, 55 (minimum) per cent.; phosphates, 16 per cent.; oil 5 per cent.; and salt 4 per cent. Herring meal will also be made.

The output of the fishing industry has, of course, been heavily reduced under war conditions, and there has been a corresponding reduction in meal and other by-products. Even so, a substantial quantity of this albuminous food is available.

Bracken Roots for Pigs.— Investigations have been made by Professor James Hendrick into the possible utilisation of bracken, hitherto looked upon as a noxious weed which is destroying much pasture land, especially in Scotland.* He states that the fronds which appear above ground in spring are not relished by stock, and, though said in their young state to be wholesome, they appear to be poisonous when fully grown. Outbreaks of bracken poisoning take place from time to time when stock, driven by hunger, or for some other reason, eat large quantities of the matured frond.

A few inches below the surface of the ground the bracken forms an undergound creeping stem or rhizome, which is popularly known as the bracken root. In well stocked bracken land there is a very large crop of such rhizomes, branching rods about the thickness of a finger and many feet in length. In these the bracken lays up a store of food, which it draws upon to support growth in the spring. The rhizome is in its richest state in winter, when the fronds have died down. In spring its food stores become somewhat depleted when growth starts, but there is always a considerable store of starch and other food materials. Experiments made in Scotland on measured pieces of ground have shown a crop varying from 11 tons per acre to over 60 tons per acre. Where the 11-ton crop was obtained the land was not very thickly stocked with bracken, and the rhizomes were washed free from earth before being weighed. The crop of over 60 tons was obtained on land very thickly stocked, and the rhizomes were not washed. They contained about 25 per cent. of earth and dirt, so that the crop of clean rhizomes amounted to over 45 tons per acre.

An analysis of rhizomes from the average of six samples collected in different parts of Scotland between the beginning of April and the beginning of June is as follows:—

Average Analysis (Six Samples).	Per cent.
Moisture	77·2
Oil	·2
Albuminoids	2·4
Soluble Carbohydrates	12·8
Fibre	5·4
Ash	2·0
	100·0

* See also this *Journal*, March, 1918, p. 1446, and May, 1918, p. 233, as to the value of bracken as fodder.

The samples gathered at the beginning of April before growth had begun were better than the average. They contained only 75 per cent. of moisture and about 15 per cent. of soluble carbohydrates. On the other hand, those collected at the beginning of June, when a considerable growth of frond had already taken place, contained nearly 80 per cent. of moisture, while the soluble carbohydrates had diminished to about 11 per cent. The soluble carbohydrates consist largely of starch, though other substances are present.

A number of experiments have been made with pigs, and it has been found that both breeding and feeding pigs will eat the rhizomes readily, except in cases where they have been receiving a rich diet of concentrated foods. It has also been found that, where pigs are turned out unringed on bracken land, they root up the rhizomes for themselves and eat them eagerly. In the past efforts have been made to eradicate bracken by cutting or otherwise destroying the fronds. If pigs can be fed on bracken land a double purpose will be served. Food will be provided for the pigs in the rhizomes of the bracken, and the land will be cleared. On the other hand, it is only in exceptional circumstances that it will pay to dig up bracken rhizomes in order to feed stock. As a rule, bracken land is hilly and stony or full of the roots of trees.

Experiments in feeding cattle and other stock on bracken rhizome meal are in progress. (*National Food Journal*, 10th July, 1918.)

Storage of Sulphate of Ammonia on Farms.

SULPHATE of ammonia may be stored in two ways, either in bags or loose in a heap. Whichever method is adopted, the building in which it is stored should be dry and free from dampness. Buildings easily penetrated by rain, or with damp walls or floors should be avoided.

If stored in bags, a platform under which the air can circulate should be constructed with a space about 6 in. from the floor, and the sacks piled carefully one on top of the other, lengthways, with mouths turned outwards. Care should be taken to leave a space all the way round the pile. This not only facilitates loading, unloading and packing, but also allows air to circulate all round. If the building of the platform presents any difficulties the sacks may be piled on one or more layers of hurdles. Before constructing the platform, the floor underneath should be covered about 3 in. deep with some dry substance, which will absorb any moisture which may drain off from the sacks.

The best substances for this purpose under ordinary circumstances are castor meal, rape meal, bone flour or raw bone meal, as they can be used afterwards as fertilisers; but in determining whether it is profitable or not to use them at the present time, regard must be paid to the price at which they are obtainable. Failing these a layer of dry earth, sand, peat

moss, or sawdust will suffice. It is not advisable to use superphosphate for this purpose. Neither chalk, lime, nor basic slag should on any account be employed, as they "set free" the ammonia and thus cause wastage.

In this connection it may be remarked that unless brought into contact with running water in which it will be dissolved and washed away, sulphate of ammonia will not lose any of its fertilising value, however long it is stored. Except in the case of the "neutral" quality,* which is practically dry, there may be a slight loss in bulk during storage owing to evaporation of moisture, but this will not exceed 1 to 2 per cent., and does not affect the fertilising value, as there will be no loss of ammonia or nitrogen.

Farmers will find it to their advantage to secure the "neutral" quality wherever possible, as this contains practically no free acid and will, therefore, not attack or rot the bags. With ordinary qualities of sulphate of ammonia in which free acid is present, there will always be a tendency for the bags to rot during storage, and it is in view of this that some farmers prefer to empty out the sacks on receipt and store the sulphate in bulk.

The same principles apply to storing in bulk as to storing in sacks. The floor should be covered about 6 in. deep with one of the absorbent substances indicated above, and if the heap touches the sides of the building, the eaves should be carefully inspected from the inside to see that there is no discharge of water from leaky spouts. The building and its walls and floor should, of course, be perfectly dry.

The sacks should be well shaken out, and if subsequently required to contain other materials, they should be washed out immediately in water.

Before applying to the land, care should be taken to see that the sulphate of ammonia is not in a lumpy condition, and it will be found advantageous to pass it through a ¼-in. riddle, breaking the lumps down with a piece of wood.

This procedure will not be necessary if "neutral" sulphate can be secured, as this quality does not cake nor contain lumps, but remains free like sand. Sulphate of ammonia in this condition can be applied through a drill. When a small amount is being applied unmixed with other manures it is usually

* Sulphate of ammonia containing less than ·025 per cent. of free acid is known commercially as "neutral" sulphate of ammonia.

found advantageous to mix it with an equal quantity of sifted earth or sand to help even distribution.

(*This article is also issued as Food Production Leaflet No.* 53, *copies of which may be obtained free and post free on application to the Secertary, Board of Agriculture and Fisheries,* 3, *St. James's Square, London, S.W.* 1.)

THE following Note was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food on 10th August :—

The Farmer and the Dung Heap.

Every farmer knows full well that successful farming depends on, among other things, good tillages, clean land, and the right use of dung. Very few farmers need teaching how to keep the land clean or how to prepare the land for crops: they would be poor farmers if they did! Yet how many of them neglect that little gold mine of the farm, the dung heap, and through carelessness that needs only a little trouble to avoid, allow the best part of the dung to go into the nearest drain instead of where it can do most good, on the land.

Let us put it into figures. Before the war, farmers in the United Kingdom used about 27,000,000 tons of farmyard manure containing 185,000 tons of nitrogen, or more than seven times as much nitrogen as was put on to the land, in the form of artificials. With bad storage and making, as much as *half the nitrogen* in the dung can easily be lost. Even with care a certain amount must be lost, but by taking precautions the farmers of the United Kingdom could easily save the equivalent of 100,000 tons of sulphate of ammonia, and with sulphate of ammonia at its present price, a little thought will show the farmer how much money he is losing every year through want of sufficient care in handling and storing the dung. If the muck can be spread green, all well and good, but most systems of cropping necessitate the use of well rotted or half rotted dung. The question then arises: "How am I as a good farmer to make the most of what dung my stock produces on my own farm?" The points to be considered are very simple and few, and it is urged on every farmer to go through them one by one and see if there is any possibility of improvement. The questions to be answered are :—

(1) Is the dung made in covered yards, and if so, is the spouting and roofing good, or is half the goodness of

the dung lost at every good storm through a broken water spout or leaky roof?

(2) If made in open yards, is the dung carted out as soon as possible and tightly clamped into as compact a heap as possible? Some careful farmers even go as far as to protect the half finished clamps with straw thatched hurdles, and nearly all of them cover the heap with a layer of earth when finished.

(3) In the case of the dairy herd, is the manure thrown out from the cowsheds either kept well protected from the rain or carted straight out on to the land, or is it thrown out into the open so as to be almost worthless when spread?

(4) Last but not least; is a *liquid manure tank* kept where-ever possible? The liquid portion of the manure is a very valuable fertiliser, and in Denmark, special care is taken of the liquid manure, which is generally carted out on to the grass and pumped over the land *in early morning before the dew is off the grass.*

The points given are so obvious that the lay mind considers them trivial, but, as every farmer knows, success in farming depends on the attention to the little details which the ordinary man is apt to miss.

Distribution of Fruit and Vegetables through the London and Provincial Markets.

THE increasing difficulties of efficient distribution of fruit and vegetables through the London and provincial markets, owing to the abnormal conditions now prevailing, render it imperative in the public interest, to avoid waste of road and rail transport.

Growers, railway companies, salesmen and others concerned, therefore, should conform with the following rules regarding the distribution of produce:—

1. Full Loads to One Consignee.—Growers should co-operate in collating their produce, so far as practicable, in full truckloads for one consignee in one market, thus avoiding unnecessary splitting up of the loads between various consignees, which delays delivery to the market, and wastes labour and cartage strength.

When this course is adopted, one of the senders should act as the nominal consignor, for the purpose of obtaining the advantages of the reduced railway rates, where they are

provided, for such consignments. Local Committees of growers in each area should be formed to carry out this recommendation.

2. Overnight Advices of Forwardings.—Senders should advise the railway station authorities overnight of the approximate quantity of produce they expect to forward the following day (weather and other circumstances permitting).

3. Produce to be Sent to the Nearest Markets.—The demands of the nearest local market should be supplied first, not only to relieve congestion in the redistribution markets, but also to prevent waste of transport.

4. Fruit for Preserving.—Fruit intended for pulping, or jam making should not be consigned to a market, but to the order of the consignee, so that it may be delivered direct from the station to factory, thereby reducing the demands on both transport and labour.

5. Provision of Labour for Loading.—In view of the serious shortage of labour, the local committee of growers should lend every assistance to the railway in securing prompt loading of local produce at country stations.

6. Labelling Odd Packages.—All odd baskets, mats and bags of produce sent by rail, must be fully and clearly labelled.

7. Returnable Empty Packages.—The economical distribution of empty packages is of great importance owing to the shortage of supply. To obtain speedy return of these empties :—

(*a*) Bushels, half bushels and peck baskets must be tied in bundles of 8, and each bundle labelled with the name of the consignee and the station.

(*b*) Arrangements should be made, as far as possible, for empties to be brought together, in order to make full loads to the various destination stations, irrespective of the number of consignees at such stations.

(*c*) The practice of sending empties to country stations *on the chance* of finding growers who will fill them, must cease.

(*d*) Whenever possible, empties should be returned direct to the growers or producing centres.

(*e*) Growers and others in country districts must remove empties promptly after their arrival at the railway station, and store them properly when not required for immediate use.

(This article is also issued as Food Production Leaflet No. 52.)

THE following information is extracted from *The National Food Journal*, 28th August, 1918:—

1918 Potato Crop: Details of the Distribution Scheme.

Full details of the scheme for the distribution of the 1918 potato crop are printed below. It should be noted that this scheme does not apply to seed potatoes sold for planting.

DIVISION OF COUNTRY INTO ZONES.

1. Great Britain will be divided into (*a*) areas which will have no surplus potatoes for export, but will require in most cases to import potatoes from other parts of the country; (*b*) areas which will have a surplus of potatoes for export to other parts of the country.

N.B.—Scotland will be regarded as one area. There will be 20 zones in England and Wales, nine being surplus areas and 11 deficit areas. A list of the zones is given. It will be noticed that each zone is contained within the boundaries of a Food Control Division.

DEFICIT ZONES.

(*a*) **The Potato Control Committee.**—2. In every deficit zone a Potato Control Committee will be appointed under the chairmanship of the Food Commissioner or his representative. This Committee will include:—

(i) Representative dealers and growers.

(ii) A Divisional Potato Inspector appointed by the Vegetable Supplies Branch, but attached to the Divisional area and under the discipline of the Divisional Food Commissioner.

(iii.) A railway transport officer, who will be appointed by the Director-General of Storage and Transport.

This Committee will be associated with an official clearing-house in each zone, and the Secretary of the Committee, who will be in charge of the clearing-house and also the executive officer of the Committee, will be appointed from the trade by the Ministry of Food.

(b) Functions of Clearing House.—The functions of the clearing-house will be:—

(i.) To publish and enforce general rules laid down by the Ministry of Food, *e.g.*, for securing that better keeping varieties of potatoes are reserved for later consumption.

(ii.) To make and enforce any local additional rules found necessary in the zone for similar purposes.

(iii.) To issue transport permits where necessary, and deal generally with all transport difficulties (road, rail and ship).

(iv.) To take deliveries of, and pay the grower for, any potatoes which the Food Controller is liable to purchase, but which cannot be disposed of otherwise under the scheme.

(v.) To collect the indents for imported potatoes and give the necessary orders to the supplying zones.

(vi.) To advise on claims by growers on the Ministry of Food for damage other than normal wastage.

(c) Functions of Potato Control Committee.—

(i.) To receive and deal with complaints from traders that they cannot obtain sufficient potatoes.

(ii.) To receive and deal with complaints from growers that they cannot dispose of potatoes which should be put into consumption.

(iii.) To deal with any complaints and disputes between growers and dealers or between importers and exporters as to the grading of potatoes in their district.

(iv.) To deal with any complaints from growers that they have been unreasonably required to load or from dealers that growers have displayed negligence in loading.

(v.) To receive periodical statements of account from traders buying from producers in their area and to pass them to the Divisional Accountant for adjustment.

(vi.) To issue licences authorising the direct purchase of potatoes from growers by retailers or large consumers who have been accustomed to buy direct.

(d) Control of Distribution in Deficit Zones.—The principal points in which the distribution of potatoes within deficit zones will be controlled are as follows :—

(1) Only persons holding licences may deal in potatoes.

(2) Growers will have to be paid within 14 days of collection the price fixed by the Joint Commission appointed by the Ministry of Food and Board of Agriculture.

(3) Any rules laid down by the Ministry or by the Potato Control Committee as to the restriction of good keeping varieties will have to be observed.

(4) Retail prices for the public will be fixed.

(5) The price of potatoes bought wholesale from a dealer will be fixed.

The machinery consequent on these restrictions is outlined in the succeeding paragraphs.

(e) Licensing of Dealers.—No one in the deficit zone will be allowed to buy potatoes from growers unless duly licensed. Licences will be issued mainly to existing dealers, but in certain cases they will also be issued to retailers and large consumers who can prove that they have been in the habit of buying direct from a grower in previous years.

Licences will be issued to dealers by the Ministry of Food on the existing recommendations from the National Federation and the Co-operative Wholesale Society, but they will be subject from time to time to any fresh recommendations or review on the part of the Potato Control Committee. Those licences to wholesale dealers will not carry with them any restriction on the quantities to be purchased provided that direct purchases will only be allowed within the zone for sale within the zone. Licences issued to retailers and large consumers accustomed to buy direct will be issued by the Potato Control Committee, and will in every case be for a quantity based on previous dealings. In all cases where the retailer or consumer purchases direct from a grower, the price paid by such retailer or consumer will be identical with the fixed price in the zone for similar purchases through a wholesaler. These licences will be subject to the payments by the holder of a fee (to be paid by instalments, if necessary) covering the difference between the fixed grower's price and the fixed wholesaler's price less any charges for extra haulage approved by the local Food Control Committee.

(f) Failure to Pay Grower.—In the event of a dealer failing to pay the grower within 14 days, the grower will complain to the Potato Control

Committee, and the latter, if satisfied that his claim is correct, will pay the grower and report the case to the Ministry of Food with a view to the dealer's licence being cancelled forthwith.

(g) Adjustment of Prices with Ministry.—Every dealer purchasing Potatoes from a grower will have to account to the Potato Control Committee for the purchase and resale, paying to the Ministry of Food any profit in excess of his fixed commission, and recovering any loss on the transaction. The dealer will pay the railway the actual freight charge, and account to the Ministry of Food for the difference between this and an assumed flat charge. The cartage and market dues will be fixed in each locality by the Food Control Committee.

(h) Free Trade in Zones.—Subject to the restrictions set out in the preceding paragraphs, there will be free trade within every zone, *i.e.*, there will be no restrictions as to the growers from whom the potatoes may be bought or the quantities in which they may be bought by a wholesaler. The Potato Control Committee will be given the necessary powers for compelling dealers in their district to collect potatoes from producers when satisfied that such stocks are in risk of serious deterioration unless brought into early consumption.

(i.) Collection of Imports.—Dealers in any deficit zone who require to import potatoes will send in their individual indents to the Potato Control Committee indicating the quantity and grade (see para. 4) of potatoes required. The Potato Control Committee will send this collective indent to the chairman or chairmen of the zonal committee or committees assigned to them for the purpose of the Ministry of Food. The imports will be consigned to the Executive Officer of the Potato Control Committee, and will be distributed in accordance with arrangements made by this Committee.

SURPLUS ZONES.

(a) The Zonal Committee.—3.—In every surplus zone the Zonal Committee will be appointed under the chairmanship of a trader appointed by the Ministry of Food. This committee will include :—

(i.) Selected collecting dealers within the zone nominated by all collecting dealers who hold licences.

(ii.) A Divisional Potato Inspector appointed by the Vegetable Supplies Branch, but attached to the Divisional area and under the discipline of the Divisional Food Commissioner. The inspector will attend meetings of the committee, but will not have a vote.

(iii.) A Zonal Accountant who will be a member of the staff of the Divisional Accountant, and therefore under the Divisional Food Commissioner. He will attend meetings of the zonal committee, but will not have a vote.

(iv.) A transport officer appointed by the Director-General of Storage and Transport. He will attend meetings of the committee, but will not have a vote.

(v.) Two representatives of growers within the zone nominated by the local branch of the National Farmer's Union.

(b) Functions of Zonal Committee.—The functions of the zonal committee in the surplus zone will be the same as those of the Potato Control Committee within the deficit zone so far as the internal trade

is concerned, with the exception that if any case of dispute arises which the zonal committee is unable to adjust, it will be referred to a divisional tribunal constituted as follows :—

1. The Divisional Food Commissioner as chairman.
2. The chairman of the zonal committee concerned.
3. A representative nominated by the National Farmers' Union for the district concerned.
4. A member of the headquarters staff of inspectors appointed by the Director of Vegetable Supplies.
5. The Divisional Accountant.

(c) Functions as an Exporting Committee.—Apart from the functions of the zonal committee as laid down in paragraph 2 for deficit zones, this committee will also be required to make the necessary arrangements for the export of potatoes to deficit zones in accordance with the general scheme laid down by the Ministry of Food. These functions will be performed in the following manner :—

The clearing-house in deficit zones will forward collective indents in the manner laid down in paragraph 2 (*b*) sub-section (v). The zonal committee at the beginning of the season will arrange for the collection of potatoes over specified sections of line or area of country within the zone by all the registered collecting dealers in the zone. Thenceforward the collective indent will be forwarded to the chairman of the zonal committee, who will distribute the order in accordance with the general scheme laid down by the zonal committee at the beginning of the season. The collecting dealers will advise the chairman of the zonal committee the quantity and grade of potatoes which have been placed on rail, and the grower will be paid by a cheque from the chairman's office, signed by the chairman and the zonal accountant jointly, and drawn on the Ministry of Food's account in the zone. The Secretary of the Potato Distribution Committee in the deficit zone will pay for the potatoes sent to that committee within 7 days of their arrival, and at the wholesale price laid down by the Ministry of Food according to grade. In sending in the collective indent the Secretary of the Potato Control Committee will indicate the stations to which consignments are to be sent and the grade which it is desired to have. So far as the stations are concerned, the chairman of the zonal committee will take care to see that instructions are carried out, but so far as grades are concerned will endeavour to meet the wishes of the exporting committees. The chairman of the zonal committee will retain the right to vary the quality according to local exigencies while preserving the quantity indented for.

All freight charges to the consignees' station will be paid from the office of the chairman of the zonal committee by means of free conveyance notes to be adjusted in his office.

(d) Distributing Committees in Consuming Areas.—In certain large consuming areas as laid down by the Ministry of Food, the importing functions of the Potato Control Committee will be devolved on special distribution committees, *e.g.*, each London market will have its distributing committee who, so far as importing is concerned, will forward their collective indent to the chairman of the zonal committee on exactly the same lines as is done elsewhere by the Potato Control Committee. It is only contemplated that those distribution committees

will be established in a comparatively small number of large consuming areas, and the chairman of a distributing committee should always *ex officio* be a member of the Potato Control Committee for the zone within which the consuming area is contained.

GRADES OF POTATOES.

4. There will be two grades of potatoes: Grade I. consisting of the varieties King Edward, Golden Wonder, Langworthy, What's Wanted and Maincrop, whilst Grade II. will include all other varieties.

Each grade will be sold to the consumer at a flat price throughout the country, and the initial prices to the consumer will be 1½*d.* per lb. for Grade I. and 1*d.* per lb. for Grade II., these prices being increased later in the season by an additional ½*d.* per lb. if this is found necessary.

It has also been pointed out that Scotland will be regarded as one area. The Potato Control Committee in Scotland will be replaced by the Central Allocation Authority, and this authority, subject to the final decision of the Ministry of Food, will have complete control both as regards internal and external trade. So far as internal trade is concerned, it will fulfil the same functions as the Potato Control Committees do in deficit zones in England. So far as external trade is concerned, it will combine the functions of the zonal committees in English surplus zones and of the divisional tribunal indicated in the preceding paragraphs. For the purpose of collecting potatoes it will utilise the organisation of the four Scottish associations.

It will probably be necessary to regulate internal railway transport in Scotland by dividing the country into several districts (which will not necessarily be coterminous with Food Divisions), and making each of these districts self-dependent for its supplies.

SUPPLIES FOR FORCES AND FOR FACTORIES.

5. The supplies of potatoes required for the Forces by the Forage Department and by the Navy and Army Canteen Board will be obtained by indent on the zonal committees and the Potato Control Committees, in order to secure that these supplies are not taken in such a way as to disorganise the system of supply for the civilian population or to cause an undue strain on railway transport.

Similarly the potato factories, which will all be situated in surplus zones, will obtain all their potatoes from the zonal committees in England, and from the Central Allocation Authority in Scotland. Supplies to factories must be regulated with reference to the needs of the population for ordinary consumption, and cannot be drawn independently.

AREA MANAGED BY

Division.	Potato Control Committees.		Zonal Committees.	
N.	Northumberland Durham	1 area		
N.W.	Cumberland Westmorland Lancashire Cheshire	1 area		
N.E.	Yorkshire W.R.	1 area	Yorkshire, E. Riding " N. Riding	2 areas

Division.	Potato Control Committees.		Zonal Committees.	
N.M.	Notts. Northants. Rutland Derby Leicester	1 area	Lincoln (Holland) ,, (Kesteven) ,, (Lindsey)	3 areas
M.	Hereford Worcester Salop Warwick Stafford	1 area		
E.			Cambridge & I. of Ely Huntingdon Bedford	1 area
			Norfolk Suffolk	1 area
H.C. (N)	Herts. Essex Middlesex	1 area		
H.C. (S)	Surrey Sussex	1 area	Kent	1 area
L.	London	1 area		
S.M.	Oxford Wilts. Berks. Hampshire Bucks.	1 area		
S.W.	Devon Cornwall Dorset Gloucester Somerset	1 area		
N.W. (A)	NORTH WALES		Anglesey Flint Carnarvon Denbigh Montgomery Merioneth	1 area
S.W. (A)	SOUTH WALES Brecon Cardigan Carmarthen Glamorgan Monmouth Pembroke Radnor	1 area		

The Immune Potato Trials: Notes on the New Seedlings.

UNLESS the Wart Disease of potatoes (*Synchytrium endobioticum*) can be checked, and that speedily, it bids fair within a very few years to become the most serious of the problems with which the potato-grower in this country has to deal. The Food Production Department of the Board of Agriculture have taken various steps to check the spread of Wart Disease; among them the prohibition of the planting

of non-immune varieties in various areas, an investigation of the cause and possible cure of the disease, and the trial of new seedlings believed to be immune from the disease.

The inspection of the trials of potatoes which are being tested at Ormskirk this year for immunity from wart disease took place during the week commencing 30th July. For several years these trials have been conducted on a small though steadily increasing scale. Obviously, it is a matter of vital importance to the potato-grower to have a recognised centre where new varieties or fresh selections may be tested for immunity under rigorous conditions. The Food Production Department issue annually for the guidance of potato-growers in areas infected with Wart Disease, a list of the potatoes that have successfully passed this test, and the verdict of Ormskirk on the resistance of a variety is authoritative.*

This year the scale of the trials has been enlarged. Not only has the total number of test plots risen to over 300, but a number of interesting points have been demonstrated. For example, a crop of an immune variety may be found which to the untrained eye looks uniform in type when growing in the field and which produces tubers of superficial similarity. These crops frequently contain "rogues" which are susceptible to wart disease and therefore render such "seed" quite unfit for planting in infected land.

The trials this year are arranged so as to illustrate points of this kind and to demonstrate the importance not only of producing a pure stock, but of keeping it pure by carefully removing the "rogues" each year. For instance, in one plot we find a carefully selected stock of a variety, and in the next plot are the "rogues" which were picked out by expert examination of the "seed" previous to planting.

Each year new seedlings are sent for trial, and the result is that the annual visit to Ormskirk has become a recognised and a pleasant addition to the duties of all the most experienced growers in Great Britain. The trials also appeal to the merchant, the farmer, and the allotment holder; and a day was set apart for the visit of representatives of each of these classes.

The production of a really good first early immune variety is a pressing need of the moment; and there is promise that successful efforts are being made to meet this need. The immunity of *Witch Hill* will probably be settled by this year's test, and *Arran Rose* (McKelvie), which proved immune as seedling No. 30 in the 1917 trials, is an interesting addition to the list. The future of *Dargill Early* was also the subject of lively discussion. *Arran Comrade* (McKelvie), second early, aroused considerable interest and seems likely to fill a useful place in its class.

It is proposed that the National Institute of Agricultural Botany, now being founded under the auspices of the Board of Agriculture, shall in future manage the Ormskirk trials, extend their scope and importance, and provide on the spot suitable buildings where the necessary research work may be carried out. The Board, the School of Agriculture of Cambridge University, and various Seed Trade Associations will be represented on the Council of the Institute, which is receiving enthusiastic and generous support from the trades concerned.

* See also Food Production Leaflet No. 21 (Wart Disease: Reports on the Immunity Trials at Ormskirk in 1915 16-17.)

Notes on Allotments.

The Growth of Allotments.—Up to 16th August, 289,853 allotment plots had been provided under the Cultivation of Lands Order, 1917. During the second week of August three local authorities arranged for just over 250 new allotments for next season. In each case, the authority had developed an earlier allotment scheme, and the new land is an addition to the areas already successfully cultivated in the respective districts. Chislehurst is acquiring 8 acres of new land; Withernsea, 3½; and Elloughton and Brough, 6 acres.

Beckenham is achieving excellent results in assisting in the domestic food production of the country. The population is 34,000, of whom 7,900 are householders. Ninety per cent. of these householders are growing vegetables in their gardens; and 2,200 of them are allotment holders. At Shipston-on-Stour 93 persons are cultivating allotments, averaging over a quarter of an acre each, the total area being 27 acres. Moreover, 50 per cent. of the 344 householders are growing foodstuffs in their gardens. Seventy-five per cent. of the 800 householders at Tavistock have gardens which are being utilised for food growing. In addition more than half the householders have allotments averaging one-twelfth of an acre apiece. At Axminster about 60 per cent. of the 450 householders are cultivating kitchen gardens. Thirty per cent. of them are also allotment holders with about 10 poles each.

Home-saved Seed Potatoes.—Most potato growers are now agreed that "a change of seed always pays," but there are still sceptics who doubt the necessity of frequently renewing their seed supply from outside, instead of relying mainly on seed from their own crops. To these the following facts recently reported by the Food Production Department of the Board concerning the allotments at Ruskin Park, Camberwell, may be recommended for careful consideration. An inspection of the allotments showed that potato disease is very prevalent there; and in certain cases the crop will be a partial failure. In most of these cases home-saved seed was planted. On the other hand every plot planted with seed from Scotland or Ireland direct looks well, and none of them appeared up to the middle of August to have been affected by blight.

Assistance to Allotment Holders.—Although the Food Production Department is anxious, wherever possible, that would-be allotment holders should make their own friendly arrangements with the owners of land, its representatives are always ready to assist with advice in any case where difficulties may arise as to the amount of rent to be paid, or other matters. Recently, for instance, in Cheshire a representative of the Department succeeded in obtaining a reduction of rent from £42 to £32 10s. for 7 acres of land held by an allotment society. The Department has also been able to arrange for the continuance of tenancy in many instances where notice to quit had been served.

Grants in Aid of Agricultural Research.

THE following is a Statement showing the Estimated Grants in Aid of Agricultural Research carried on at Research Institutions and other Research Centres and the nature of the research work in respect of the financial year ending 31st March, 1919. The whole of the money expended was obtained from the Development Fund, with the exception of £450 of the £2,900 spent on research in fruit growing at the University of Bristol:—

Subject of Research and Name of Institute to which the Grant is paid.	*Provision in respect of the Financial Year ending 31st March, 1919.*
Research Institutions.	£
Plant Physiology—Imperial College of Science and Technology	1,700
Plant Breeding—University of Cambridge ..	1,400
Fruit Growing—University of Bristol	2,900
Plant Nutrition and Soil Problems—Rothamsted Experimental Station	2,850
Animal Nutrition—University of Cambridge ..	2,000
Animal Pathology—Royal Veterinary College ..	1,630
Dairying—University College, Reading	1,950
Zoology (Helminthology) — University of Birmingham	1,080
Zoology (Economic Entomology) — Victoria University, Manchester	650
Agricultural Economics—University of Oxford	1,500
Other Research Centres.	
Fruit Growing—South-Eastern Agricultural College, Wye (East Malling Fruit Research Station)	500
Animal Nutrition—University of Leeds	1,000
Animal Breeding—University of Cambridge ..	190
Glass-house Culture of Crops—Waltham Cross Experimental Station	500
Woburn Experimental Station	500
Norfolk Experimental Station	100
Total	£20,450

Women's Work on the Land.

The Women's Land Army.—The demands for women for threshing and potato lifting are larger than the numbers available, and a recruiting campaign has therefore been conducted in the holiday resorts of Kent and Sussex.

Three new hostels were opened during the third week of August in Yorkshire, at Menthorpe, Parlington and Huddleston. In the case of the two latter places, they will develop a district which hitherto has been little touched by woman labour. The arrangements and prospects are hopeful, and orders for women are already being received.

The Oxted Tractor Training School for women is very successful. The women are taking a keen interest in their work. The mechanic in charge gives an excellent report of the ability of those women who have already passed through the school and speaks most encouragingly of the present students.

Women's Institutes.—Four new Institutes were started during the third week in August. The Essex Federation of Women's Institutes has undertaken the collection of blackberries in 200 parishes in connection with the scheme organised by the Food Production Department and the Ministry of Food.

An All-women Farm.—Last October the West Devon Executive Committee took over Great Bidlake Farm, Bridestowe, which is being used as a training centre for women. The farm, which consists of 134 acres, was formerly all in grass, but 73 acres have been ploughed up and are now carrying good crops of corn, roots and potatoes. All the work on the farm, with the exception of a little ploughing last autumn, has been done by women. The Food Production Department state that the buildings are in excellent condition and that the farmyard is one of the best kept in the West Country.

Women and Thatching.—Many farmers this year seem almost as troubled about the thatching problem as they are about the difficulty of getting in satisfactorily their generous crops. In various counties schemes for teaching women and lads how to thatch are being run with a greater or less degree of success. Generally, it has been found that fairly strong young women are able to do this work very well after a few weeks' training; indeed, in some of the Western Counties really excellent thatching has been done by women who knew nothing of it a short time ago. At Foleshill, near Coventry, two local farmers have arranged to put ricks at the disposal of the Women's Land Army for practical tuition in thatching. An expert woman thatcher will train 8 other women at a time. It is to be hoped that farmers will make arrangements as soon as possible for the employment of these women on the completion of their training. It is a curious fact that whilst on the one hand we hear farmers complaining that they do not know how they will get their ricks thatched this year, on the other hand a number of trained women thatchers have lately been unemployed, or rather have had temporarily to fill up their time at flax pulling. Thirty women have recently been sent to Somerset to be trained in the stacking of flax and in thatching.

Scheme for the Distribution of Seed Wheat of the 1918 Harvest.

THE Food Production Department have made arrangements for the selection by Professor Biffen of seed wheat of the following varieties harvested in 1918—"Browick," "Little Joss," "Rivett," and "Yeoman." Every endeavour is being made to set a high standard of purity and quality for all seed distributed under this scheme. The Department will not supply farmers direct but have appointed agents from whom the seed wheat may be obtained, either direct by the farmer, or through a local corn merchant. Particulars of the names and addresses of the agents will be found in the advertisement appearing in this issue.

The following notes may serve as a guide in the selection of varieties:—

YEOMAN.—A new wheat raised at Cambridge in 1916. Ears medium length; white chaff; light red grain; straw medium length and very stiff. This wheat possesses high yielding and first-class milling properties and can be grown on all classes of soils. The supply of stock seed of this variety is very limited in quantity.

LITTLE JOSS.—Ears long; chaff red; grain red; straw a little over the average length, but stands well. This wheat tillers very freely and matures early. It has been successful on every kind of soil and is particularly suitable for light soils, late districts, and exposed situations.

RIVETT.—The well known bearded or cone wheat. Should be sown as early as possible. Chiefly grown on clay soils. Being awned, this wheat is to a large extent "sparrow proof" and will be found a useful variety to sow where birds are likely to do damage to ripening crops.

BROWICK.—Ears compact; chaff white; grain red; straw medium length and stands well. This wheat does particularly well on good loam soils.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1*d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1; 37, *Peter Street, Manchester; and* 1, *St. Andrew's Crescent, Cardiff.*

The Cultivation of Lands Order, 1918 (No. 2).

THE following Order (No. 1047), dated 19th August, 1918, has been made by the Board of Agriculture and Fisheries under Regulation 2M of the Defence of the Realm Regulations:—

Whereas under Regulation 2M of the Defence of the Realm Regulations (which so far as the same is applicable to England and Wales is set out at the foot of this Order), the Board of Agriculture and Fisheries (hereinafter referred to as "the Board") are empowered, after such consultation with the Food Controller as may be arranged, to exercise certain powers with a view to maintaining the food supply of the country, and to authorise any person, or any body constituted by the Board for the purpose, to exercise on behalf of the Board the powers conferred on the Board by Regulation 2M, and to prescribe the procedure of any such body and the authentication of any notice or other instrument issued by any body or person so authorised.

And whereas the Board, after consultation with the Food Controller, are of opinion that for the purpose aforesaid such Order as is herein contained should be made.

Now the Board of Agriculture and Fisheries do hereby order as follows:—

1. The persons who are for the time being appointed by a county council of an administrative county to act as members of the War Agricultural Committee for the county are hereby re-constituted as the body to exercise in manner herein provided such of the powers conferred on the Board by Regulation 2M as are hereby authorised to be so exercised.

2. The body hereby re-constituted shall maintain an executive committee consisting (1) of members appointed by the said body, not less than four nor more than seven in number, unless the Board otherwise direct, and (2) of additional members appointed by the Board In the case of a county in Wales (including Monmouthshire), two of the members so appointed by the body hereby re-constituted shall be the members representing the council of the county on the Welsh Agricultural Council. If any vacancy occurs among those members of an executive committee who are appointed by the body hereby re-constituted, the executive committee may appoint any person to fill the vacancy so arising.

3. (1) The body hereby re-constituted for a county, acting through the executive committee, may on behalf and at the expense of the Board, but subject to such directions as to approval of expenditure or otherwise as may from time to time be given by the Board, and subject also to the restrictions imposed by this section, exercise within the county any of the powers of the Board under Regulation 2M (except the powers conferred by paragraphs (*eee*), (*f*), (*k*), (*l*), (*m*), (*n*) and (*o*) of Section (1) of that Regulation) and appoint such officers and incur such expenses as the committee may consider necessary or expedient for such purposes; provided always that

(*a*) The committee shall not enter on or take possession of any common land as defined by this Order, or take possession of any inhabited dwelling-house, without a further consent given by the Board; and

(*b*) Where any notice is served under the powers contained in paragraph (*i*) of section (1) of the Regulation such notice shall contain a provision to the following effect :—

> This notice shall take effect at the expiration of seven days from the date of service hereof, unless before such expiration notice of appeal to the Board of Agriculture and Fisheries is given in writing to the Secretary to the War Agricultural Executive Committee, and in the event of any such appeal this notice shall take effect on such date (if any) as the Board shall determine after considering the appeal.

(2) The rights of any person dealing with the committee shall not be affected by any question as to compliance by the committee with any directions so given by the Board to the committee, or the requirement of consent in the case of common land or an inhabited dwelling-house.

4. (1) The Corn Production (Amendment) Act, 1918, provides that any person who on or after the 21st August, 1918, is under the powers of the Defence of the Realm Regulations exercisable by the Board with a view to maintaining the food supply of the country with respect to matters dealt with in Part IV. of the Corn Production Act, 1917, served with a notice which requires any change in the mode of cultivating or in the use of land in his occupation and is not solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry may within the time prescribed by the Board require a reference to arbitration of the question whether it is undesirable in the interest of food production that the change should apply to any portion of the land included in the notice. A copy of any such notice served on a tenant is at the same time to be served on the landlord.

Every such notice shall contain the notification of a right to appeal referred to in paragraph (4) of this section.

(2) The Act of 1918 also provides that before possession is taken under the said powers on or after the 21st August, 1918, for the purpose of securing any change in the mode of cultivating or in the use of land other than the conversion of the land into gardens or allotments, notice of intention to take such possession shall be served on the owner and occupier of the land if they can reasonably be ascertained, unless the notice is served solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry, and that an owner or occupier so served shall have the same right of reference to arbitration as is set out in the preceding paragraph of this section.

Except where possession is taken for the purpose of converting the land into gardens or allotments or solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry, a notice is required to be thus served, and every such notice shall contain *the notification of a right to appeal referred to in paragraph* (4) *of* this section.

(3) Where possession is taken by the Committee of any land for conversion into gardens or allotments or solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry, the Committee shall on or before the taking of possession give notice in writing to the owner and the occupier of the land if they can reasonably be ascertained, of the purpose for which possession has been or is to be taken.

(4) Except in the case of a notice to which the last preceding paragraph of this section relates, any notice to which this section relates which is served under this Order on or after the 21st August, 1918, shall contain a provision to the following effect :—

> The occupier or owner of the land to which this notice relates is entitled by notice given to the Secretary of the War Agricultural Executive Committee within fourteen days from the date of the service of this notice on him to require the reference to arbitration of the question whether it is undesirable in the interest of food production that the change in the mode of cultivating or in the use of the land required by this notice should apply to any portion of the land.

5. An executive committee shall from time to time report their proceedings to the body re-constituted by this Order for the county, but the acts of the committee shall not be subject to confirmation by that body.

6. A member of an executive committee shall not take part in any decision of the committee which relates to land of which he is the owner or occupier, or the agent of the owner or occupier, or enter into any contract with the committee, unless such contract has been approved by the Board.

7. Accounts shall be kept by an executive committee of their receipts and expenditure and be open to inspection by any officer of the Board and those accounts shall be made up and audited in such manner as the Board shall direct.

8. An executive committee shall appoint a chairman of the committee. At any meeting at which the chairman is not present a person appointed by the meeting shall be entitled to act as chairman of the committee. At any meeting of an executive committee the chairman shall, in case of an equal division of votes have a second or casting vote.

9. The quorum, proceedings and place of meeting of an executive committee shall be such as the committee determine.

10. The proceedings of an executive committee shall not be invalidated by any vacancy among its members, or by any defect in the appointment or qualification of any of its members.

11. Minutes of the proceedings of an executive committee shall be kept in a book provided for that purpose, and a minute of those proceedings signed at the same or the next ensuing meeting by a person describing himself as, or appearing to be, chairman of the meeting at which the minute is signed shall be received in evidence without further proof.

12. Any notice, direction or other instrument signed by a person describing himself as, or appearing to be, chairman of an executive committee shall be received in evidence without further proof as a notice, direction or instrument issued by the executive committee.

13. Until the contrary is proved an executive committee shall be deemed to have been duly constituted.

14. An executive committee may, subject to any directions given by the Board, appoint such sub-committees as the committee thinks fit. A sub-committee may consist either wholly or partly of persons not being members of the executive committee.

15. An executive committee may act on behalf of the Board in any arbitration under the Corn Production (Amendment) Act, 1918, whether relating to compensation or any other matter.

16. In this Order, the expression "common land" includes any land subject to be enclosed under the Inclosure Acts, 1845 to 1882, and any town or village green and any other land subject to any right of common.

17. The Cultivation of Lands Order, 1918, is hereby revoked, but so that such revocation shall not affect the previous operation of such Order or anything done under it, or affect any right or liability acquired or incurred under such Order and any reference in any document to the Order hereby revoked or to any body constituted by any such Order shall be considered as a reference to this Order or to the body reconstituted by this Order.

18. This Order applies only to administrative counties in England and Wales.

19. This Order may be cited as the Cultivation of Lands Order, 1918 (No. 2).

In witness whereof the Board have hereunto set their Official Seal this nineteenth day of August, nineteen hundred and eighteen.

(L.S.) T. H. MIDDLETON,
Assistant Secretary.

REGULATION 2M SO FAR AS THE SAME IS APPLICABLE TO ENGLAND OR WALES.

[NOTE.—Those paragraphs containing powers which are not delegated to Agricultural Executive Committee are indicated by a black line in the margin.]

"2M. (1) Where the Board of Agriculture and Fisheries, after such consultation with the Food Controller as may be arranged, are of opinion that, with a view to maintaining the food supply of the country, it is expedient that they should exercise the powers given to them under this regulation, the Board may—

"(*a*) Enter on and take possession of any land which in their opinion is not being so cultivated as to increase, as far as practicable, the food supply of the country, and, after entry thereon, do all things necessary or desirable for the cultivation of the land or for adapting it for cultivation; and for such purposes enter on and take possession of any buildings on the land or convenient for such purposes; and

"(*b*) Take possession of any machinery, implements of husbandry or plant (other than machinery, implements or plant in the possession or under the control of a dealer or manufacturer), or any farm produce, stock, or animals, which, in the opinion of the Board, are required for the cultivation of land or the increase of the food supply of the country; and

"(*c*) Provide accommodation for persons, machinery, implements of husbandry or plant, farm produce, stock or animals, employed or used by the Board for the cultivation of land or the increase of the food supply of the country, by taking or retaining possession of any land or buildings; and

"(*d*) Utilise any water supply or motive power for any such purposes; and

"(*e*) By notice served on the occupier of any land require him to cultivate the land in accordance with such requirements as the Board may think necessary or desirable for maintaining the food supply of the country and may prescribe in the notice; and

"(*ee*) By notice served on the occupier of any land require him in accordance with the terms of the notice to adapt the land for cultivation by repairing or removing any hedge or fence on the land, or by clearing or repairing any ditch or drain, whether natural or artificial, by which the land is capable of being drained; and

"(*eee*) By order, applicable generally or to any specified area, and published in such manner as the Board may consider to be best adapted for informing persons thereby affected, prohibit or regulate the use of land for the cultivation of any crop specified in the order and by any such order require the ploughing up within such time as may be specified in the order of any land in use at the date thereof for the cultivation of any such crop; and

"(*f*) By notice served on the tenant of any land which or part of which, in the opinion of the Board, is not being so cultivated as to increase as far as practicable the food supply of the country, determine his tenancy of the land on such date as may be specified in the notice, or, on the application of the landlord by order authorise him in any such case to determine the tenancy in accordance with the terms of the order; and

"(*g*) After entry on any land arrange for its cultivation by any other person whether by contract or tenancy or otherwise; and

"(*h*) Where, in the opinion of the Board, any land is injured or is likely to be injured by any such neglect on the part of the proprietor or occupier of any other land in relation to the maintenance of banks or the cleansing of channels as is mentioned in section 14 of the Land Drainage Act, 1847, and subject to, and after the expiration of 7 days from, the service of such notice as is required by that section, exercise such powers of executing all necessary works and recovering the expenses thereof as are by that

section conferred on the proprietor or occupier of any land which is injured by any such neglect, and for any such purpose to enter on any land without any warrant or authority ; and

" (*i*) By notice served on the occupier or person in control of any dam, mill, lock, sluice, weir, or other structure affecting the flow of water in any river or stream require such occupier or person to keep open or closed any mechanical appliance by which the inflow or outflow of water is capable of being regulated during such times and in such manner as the Board, having regard to the use by such occupier or person of the structure and of the water thereby impounded, consider to be necessary or desirable for the prevention of floods or for the draining of land adjoining or near the river or stream ; and

" (*j*) Where, in the opinion of the Board, any land is injured or likely to be injured by flooding or inadequate drainage which might be remedied wholly or partially by the exercise of powers which are conferred by any general or local Act, or by an award made under any Act, or by any Commission of Sewers, and which are not being exercised, or in the opinion of the Board are being insufficiently exercised, exercise any such power and also any power conferred by any such Act or award or commission for defraying the expenses so incurred or for any purpose incidental to the exercise of any such power ; and

" (*k*) Enter on or take possession of any dam, mill, lock, sluice, weir, or other structure affecting the flow of water in any river or stream, and remove or repair or alter or maintain and use the same where such action is in the opinion of the Board necessary or desirable for the prevention of floods or for the drainage of agricultural land ; and

" (*l*) For the purpose of removing any obstruction to or otherwise improving the flow of water in any river or stream or maintaining or improving the banks of any river or stream or any sea defence or drainage outfall, enter on the river or stream or any land adjoining or near the river, stream, defence, or outfall ; and

" (*m*) Where any expenses are incurred by the Board in the exercise of any of their powers under paragraphs (*k*) or (*l*) of this regulation, recover those expenses, so far as they are directly attributable to the default of any person in carrying out his obligations under statute or otherwise, from that person ; and

" (*n*) On the application of any drainage authority empowered by a local Act to levy rates to a limited amount, by order increase the amount that may be so levied ; and

" (*o*) By notice served on the occupier of any agricultural land or the person having the management of any such land require him to make within such time and in such form and to such person as the notice may prescribe a return in writing with respect to the cultivation of the land or the crops or live-stock thereon or any other matter as to which the Board may desire information for the purpose of the proper exercise of their powers under this regulation but so that no such return or any part thereof shall be published or disclosed except for the purposes of a prosecution under this regulation.

"(2) An occupier of land may, with a view to maintaining the food supply of the country, submit to the Board a scheme for the cultivation of the land in a manner not consistent with the contract of tenancy of the land, and the Board, if satisfied that the adoption of the scheme is necessary or desirable for the maintenance of the food supply, may direct that the land shall be cultivated in accordance with the scheme, subject to any modification which the Board may think fit to make therein.

"(3) If any person obstructs or otherwise interferes with or impedes any officer in the execution of his powers under this regulation, or discloses or publishes any return or part thereof in contravention of this regulation, or negligently or wilfully fails to comply with the requirements of any order made under this regulation, or with any condition subject to which a licence under any such order has been granted, or, being an occupier of any land or building of which the Board require possession, or of which the tenancy of the occupier has been determined by notice served under this regulation, without lawful excuse, refuses to give possession thereof to the Board or to quit such land or building, or, having been served with a notice under this regulation requiring him to do any act, negligently or wilfully fails to comply with the requirements of the notice, or, where the notice requires him to make a return, makes a false return, he shall be guilty of a summary offence against these regulations.

"(4) If the Board at any time withdraw from possession of any land of which possession has been taken under this regulation, they may recover from any person then interested in the land as owner or tenant or otherwise, such amount as represents the value to him of all acts of cultivation or adaptation for cultivation executed by the Board; such amount to be determined, in default of agreement by a single arbitrator under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908.

"(5) Any person authorised by the Board in that behalf may, for the purposes of this regulation and upon production if so required of his authority, enter on and inspect any land or building and inspect any machinery, implements of husbandry, farm stock or produce thereon.

"(6) The Board may with respect to any land or land in any district authorise any person or any body constituted by the Board for the purpose to exercise on behalf of the Board any of the powers of the Board under this regulation and prescribe the procedure of any such body, and the authentication of any notice or other instrument issued by any body or person so authorised.

"(7) The powers conferred on the Board by this regulation shall be in addition to and not in derogation of any other powers of the Board.

"(8) In this regulation the expression 'cultivation' includes use for grazing and the expression 'cultivate' has a corresponding meaning.

. . . .

"(11) Any notice under this Regulation may be served on the person to whom it is to be given either personally or by leaving it for him at his last known place of abode or by sending it through the post in a registered letter addressed to him there."

THE following Letter (No. C.L. 73/C. 1), with enclosure, was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 15th August :—

The Food Production Programme for 1919 and the Corn Production (Amendment) Act, 1918.

SIR,—1. The Corn Production (Amendment) Act, 1918, which comes into operation on the 21st inst, modifies in certain important respects the powers of the Board and of the Agricultural Executive Committees under the Defence of the Realm Regulations. A Memorandum explaining the effect of the Act is enclosed* for the information of your Committee, which should be carefully studied in order that the necessary changes in procedure should be adopted. The Memorandum is being printed and copies will be sent to you in due course for distribution.

2. In the Circular Letter of the 15th ult., certain interim instructions were given with regard to the programme for the harvest of 1919 and the Department are now in a position to inform Committees in greater detail of the nature of the work which they are asked to undertake.

3. The recent decision to withdraw 30,000 men from the land for the Army made it necessary to reconsider the plans which the Department had prepared for the harvest of 1919, but the urgent need of increased production remains unaffected. In dealing with agriculture long views are essential, and the fact that the supply of food at the moment is somewhat more satisfactory does not justify any relaxation of the efforts of the Committee. Whether the War ends soon or late, increased production at home is a matter of vital importance. The declaration of peace may even accentuate the need, as the Central Powers will then compete with us for food supplies in the exporting markets of the world. Moreover, on grounds of finance it is imperative to reduce our foreign indebtedness as much as possible, and, in view of the continued serious situation in regard to shipping, and the increasing demands on tonnage for the use of the American Army, it is increasingly clear that our only sure hope of security during the War and of recovery afterwards is to render ourselves as nearly as possible self-supporting in regard to all essential foodstuffs. It is the duty, therefore, of the Department and of the Committees to look forward not only to the harvest of 1919, but to 1920, and subsequent years, and to lay our plans so that a forward movement may be undertaken rapidly, as the supply of labour improves.

4. The efforts of the Committees should largely be directed to improving the cultivation of the remaining grass area, and of the existing arable land, including that which has been broken up during the past 18 months, in order to secure from both the maximum possible production of food. The staff of the Committee has now been strengthened and reorganised ; public opinion has been converted to the tillage policy ; the prejudice against unaccustomed forms of labour has been broken down ; the women, the soldiers, and the prisoners have proved their capacity ; and the use of mechanical aid has been greatly extended and its efficiency improved. The Committees are therefore in a position to help farmers in many directions, and they should develop this side of their work as much as possible. At the same time they should use their powers to raise the general standard of all

* See below.

farming to the level of the best in the county. It is generally recognised that there is room for great improvement in the manner in which many farms are cultivated, and the Committees should pay special attention to negligent and indifferent farmers by helping them with advice and assistance, and, if these means fail, by using the powers of the Committees to secure such cultivation as is necessary in the national interest. Under present conditions wilful failure to make the best use of land in the interest of the Nation cannot be tolerated, and the Department are sure that Committees will not hesitate to take whatever measures are required to deal with such cases. In doing so they will have behind them the best public opinion of the whole community. By proceeding on these lines there is no reason why the production of food in 1919, from land already under the plough, should not be increased.

5. In order to make a substantial increase in 1919 on the output of corn in 1918 the Department intended to aim at adding about another 1,000,000 acres, to the arable area, of which the quota provisionally allotted to your county was —— acres. The shortage of skilled labour has rendered it impracticable to break up where such labour is really found to be deficient, but the Department are most anxious that Committees should keep this ideal in view and should encourage farmers to plough up and cultivate as arable more grass land wherever they have the strength to do so without neglecting their existing arable land.

6. It is not intended, therefore, that Committees should abstain from issuing any notices requiring grass land to be broken. Such notices should be issued in all cases where the owner and occupier agree, in order that their right to claim compensation in case of loss may be safeguarded. Notices should also be served in all other cases in which the Committee are satisfied, after careful inquiry, that the land can be put to its best productive use by growing corn or potatoes, and that the occupier has or can obtain sufficient labour to plough up the land and keep it in cultivation in addition to his existing arable land. Such notices can be referred to arbitration if the owner or occupier objects, and Committees should therefore take special pains to satisfy themselves on the points mentioned above before issuing any notice, so that if the matter goes to arbitration the Committee will have a good case in support of the notice. The governing consideration should always be whether or not it is in the best interests of increased food production that the land should be ploughed up.

(Signed) R. E. PROTHERO,
President of the Board of Agriculture.
(Signed) CHARLES FIELDING,
Director-General of Food Production.

ENCLOSURE.

1. The Corn Production (Amendment) Act, 1918, keeps in operation, with some important modifications, the powers of the Board and of the Agricultural Executive Committees under the Defence of the Realm Regulations which would otherwise have ceased to be exerciseable on the 21st August, 1918.

2. A new Cultivation of Lands Order adapted to these modifications is in preparation and will be issued shortly,* but in the meantime it is

* See p. 718.

desirable that Committees should be informed at once of the changes in procedure required by the Act. These changes fall under two main heads which will be dealt with separately.

A.—APPEALS TO ARBITRATION.

3. *In the first place*, the Act provides that the exercise of certain of the powers of the Board under the Defence of the Realm Regulations shall be subject to a statutory right on the part of the owner and the occupier of the land to have the matter referred to arbitration before the powers can be enforced. In such cases the arbitration will be before a single arbitrator under, and in accordance with, the provisions of the Second Schedule to the Agricultural Holdings Act, 1908, except that the arbitrator will be appointed, in default of agreement, by the President of the Surveyors' Institution.

4. The cases in which there will be a right to require a reference to arbitration fall under three heads, which are dealt with separately below; but Committees should understand that, with those exceptions, their powers remain unaltered, and that in regard to many branches of their work their operations can continue on the same lines as have hitherto been adopted. Even in those cases which are subject to appeal and arbitration there is no reason to fear that appeals will be numerous if the Committees exercise due care and judgment before issuing notices, and the fact that costs may be awarded against an appellant will discourage frivolous appeals.

(i.) Determination of Tenancies.—5. This power remains in the hands of the Board and is not delegated to Agricultural Executive Committees, but Committees may recommend to the Board that it should be exercised in the case of negligent or indifferent farmers whose land is not properly cultivated and where efforts have been made by the Committee without success to secure proper cultivation. *No recommendation for the determination of a tenancy should be made* unless the Committee have satisfied themselves by personal inspection on their behalf that it is essential in the national interest, and as a general rule the occupier should in the first instance be given an opportunity of carrying out such acts of cultivation as in the opinion of the Committee are necessary to secure that his land is cultivated according to the rules of good husbandry.

6. On receipt of a recommendation that a tenancy should be determined, the Board, if they are satisfied that the recommendation should be adopted, will issue a notice determining the tenancy. The notice will be served by the Committee on the occupier and a copy sent to the owner, and either of them can require that the question whether the land has been cultivated according to the rules of good husbandry shall be referred to arbitration. Pending the decision of the arbitrator the operation of the notice will be suspended.

(ii.) Notices requiring any Change in the Mode of Cultivating or in the Use of any Land.—7. The notices in this class will include those requiring grass land to be ploughed up and cultivated as arable, but not notices which are solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry. What are known, therefore, as "ploughing orders" will be subject to appeal and reference to arbitration, but not ordinary "cultivation orders." In the case of "ploughing orders" or any other notices served on or after the 21st August, requiring any change in the mode of cultivating

or in the use of any land (such, for instance, as a notice requiring an occupier to plough up a strawberry bed and to use the land for some other crop), the notice should be served on the occupier by registered post and a copy served at the same time on the owner also by registered post. If either of them within 14 days from the service of the notice requires that the matter shall be referred to arbitration, the Committee should submit to the appellant the name or names of one or more persons whom the Committee would agree to accept as arbitrator. If within (say) 10 days the appellant does not agree to the appointment of one of the persons suggested by the Committee, the Committee should apply to the President of the Surveyors' Institution, 12, Great George Street, S.W. 1., to appoint the arbitrator. It will be open, however, to the Committee or to the appellant to apply forthwith to the President of the Surveyors' Institution to appoint the arbitrator without first submitting names for consideration. When the arbitrator has been appointed he will proceed with the reference in accordance with the practice under the Agricultural Holdings Act, and it will be within his discretion to award how and by whom the cost of the arbitration shall be paid.

8. In view of the uncertainty as to when a notice can be enforced in consequence of the possibility of a reference to arbitration, and of the desirability of a definite date being fixed for the completion of any work required by the notice, so as to establish default in case proceedings have to be taken, it would be desirable, where this would meet the necessity of the case, to specify in the notice a date for the completion of the work required which is not less than three months from the date of service of the notice. Where this is undesirable the notice should require the work to be done within a specified period after the expiration of the 14 days allowed for an appeal, or where an appeal is lodged, after the arbitrator issues his award.

(iii.) Taking Possession of Land.—9. It is important that Committees should understand clearly the position under this head. Their power of taking possession of land under Paragraph (1) (*a*) of Regulation 2M remains unaltered if the land is to be converted into gardens or allotments or if possession is to be taken solely for the purpose of securing that the land shall be cultivated according to the rules of good husbandry. In those cases there is no statutory requirement that notice of the Committee's intention shall be served on the owner or occupier before possession is taken and the owner or occupier has no right to have the question referred to arbitration; but it is desirable that the owner and occupier should know that possession is being taken, and accordingly provision is being made in the new Order requiring such notification to the owner and occupier if they can reasonably be ascertained, but such notification does not give any right of appeal to an arbitrator. If, however, the Committee propose to take possession of any land for the purpose of securing any other change in the mode of cultivating or in the use of the land, notice of their intention must under the new Act be served on the owner and occupier if they can reasonably be ascertained, and either of them can require the reference to arbitration of the question whether it is undesirable in the interest of food production that the proposed change should apply to any portion of the land, and the procedure will be the same as that described under the preceding heading. It is probable that occasions will not often arise when Committees desire to take

possession of land, except for the provision of gardens or allotments, or for the purpose of securing that the land shall be cultivated according to the rules of good husbandry. If, however, a Committee desire to take possession of grass land for the purpose of ploughing it up, they will have to serve notice of their intention before doing so and the notice would give the owner and the occupier the right to have the proposal referred to arbitration.

B.—COMPENSATION.

10. The other principal change which is made by the Corn Production (Amendment) Act is in regard to compensation. Except as regards cases in which the Defence of the Realm (Losses) Commission have already determined the amount of any compensation payable or the compensation is agreed, all claims for compensation in respect of loss suffered by reason of the exercise of those powers of the Board under the *Defence of the Realm Regulations*, which are continued in operation by the Act, will in future be settled by arbitration instead of by the Losses Commission. This provision is retrospective and will apply to claims made in consequence of action taken before as well as after the passing of the Act. Instructions on this matter will be given in a separate Memorandum which will be issued shortly.*

THE following Memorandum (No. C.L. 75/C.1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 23rd August :—

Claims for Compensation.

1. **Withdrawal of Claims for Compensation from the Losses Commission.**—The Corn Production (Amendment) Act, 1918, provides as follows :—

(c) "Where before or after the passing of this Act any notice has been or shall be served, order made, or possession of land taken under the powers continued in operation by this sub-section, the provisions of this part of this Act relating to the determination and recovery of compensation shall apply as if the notice had been served, the order made, or possession taken under the powers conferred by Section 9 of this Act, except in any case in which the compensation has been otherwise determined."

Accordingly, claims for loss on account of action to which the above proviso refers will no longer be brought before the Defence of the Realm (Losses) Commission.

This change does not apply to claims for every kind of loss that may be occasioned by action under Regulation 2M, but only for loss due to action "under the powers continued in operation by this sub-section," and the effect of this limitation is explained in paragraph 7 below.

2. **Procedure now Applied to such Claims.**—Under the Corn Production Act, 1917, Section 9 (9), which is thus applied, any person interested in land in respect of which a notice has been served or an order has been made, or of which possession has been taken under any of the powers of Regulation 2 M continued in operation, who has suffered loss by the exercise of such powers is entitled to be paid by the Board such amount as represents the loss ; and the amount may take the form of periodical payment, *e.g.*, for loss of rent.

* See below.

The Statute provides that if the Board prescribe a period for making claims, the claim must be made within that period; but at present the Board are not prescribing any period within which the claims must be made.

It is hoped that in the majority of cases the Department may be able to agree with the claimant the amount due.

Failing agreement, the amount payable is to be determined by a single arbitrator. The arbitrator may be nominated in writing by agreement between the Committee and the claimant; if they cannot agree on the nomination, the arbitrator will be appointed by the President of the Surveyors' Institution on the application in writing of either the Committee or the claimant.

The arbitration will be conducted under and in accordance with the Second Schedule to the Agricultural Holdings Act, 1908.

3. **Mode of Making Claims.**—Claims for loss affected by the new Act will continue to be made through Agricultural Executive Committees. When it is desired that the claim should be dealt with forthwith it should be made in duplicate on the form F.P. 352/C1, a specimen of which is annexed to this Circular.* On receipt of such a claim in duplicate one copy should be sent by the Agricultural Executive Committee to this Department and the other retained by the Agricultural Executive Committee for report. A report should be prepared by a surveyor appointed by the Agricultural Executive Committee for the purpose or by a qualified official of the Committee as heretofore according to the specimen Form (F.P. 124), which is already in use, and should be sent to the Department as soon as possible, together with the observations of the Committee on the claim. This report should be kept confidential, and its contents should not be disclosed *to the claimant. The second copy of the claim should not be for*warded, but should be kept by the Agricultural Executive Committee for filing.

It is undesirable that the Executive Committee should make any attempt to enter into provisional agreements for the settlement of claims.

Where the claimant makes a claim for matters such as are dealt with in a tenant right valuation, and states that he proposes to make a further claim for any other matter (except reinstatement) the application should be returned to him with a suggestion that he should apply in a single application in respect of all the items for which he proposes to claim, in order that the Department may have the whole case before them at one time. As pointed out above, periodical *payments may be made; and, consequently, the making of a complete* claim at the present time will not prejudice the applicant in continuing to obtain *any compensation that may be* awarded *to him for loss of* rent and similar matters up to the time when the Committee withdraw from possession.

A copy of the tenancy agreement or leases should be sent to the Department in each case in which such a document exists.

4. **Dilapidations.**—Land of which possession is taken or of which a tenancy is determined is often in such a state that a claim would lie by a landlord against a tenant for dilapidations as regards the cultivation and also as regards the farmhouse, buildings, hedges, and ditches. In reporting on such a case the surveyor employed by the

* Not here printed.

Executive Committee should include in his report a Schedule of dilapidations, giving the price of each item, and a copy of this Schedule should be furnished to the applicant. The same remarks on this point apply where the land is in the occupation of the owner at the time of taking possession as where it is in the occupation of a tenant. In either case the Department consider that information as to the sum required to put the land into a proper state of cultivation and the buildings into repair may be of use in reducing the amounts that would otherwise be payable in respect of claims for oss occasioned by the taking of possession or the determination of a tenancy.

5. **Claims on Breaking up of Grass Land.**—It has been found in the majority of cases in which grass land has been broken up in consequence of a notice served under Regulation 2M that the amount of any loss in value of the land cannot be ascertained at the present time. Where the landlord or tenant who claims to have suffered loss is of this opinion, and is content that his claim should stand over with liberty to apply at any time for a settlement, he should send in a notice of his intention to claim on the Form F.P. 353/C.1, a specimen of which is annexed hereto,* which should be sent in duplicate. One copy should be forwarded to the Department with a copy of the notice requiring the land to be broken up, and a record of the character and condition of the grass land before breaking up (including, where possible, a statement of the annual value of the land before breaking up). Where a notice of intention to claim is received, such a record should be made forthwith. The second copy of the notice should be retained by the Agricultural Executive Committee for filing.

6. **Claims in respect of Loss arising by the Failure of Crops on Land Ploughed up under a Cultivation Order.**—When claims or notice of intention to claim are received by Committees for loss of this nature, an inspection and report should be made without delay. The report should give the area of the holding and the proportion of arable and pasture which it comprises. If the Cultivation Order was not specific as to the land to be broken up, or as to the crop to be planted, but left the choice to the occupier, it should be stated whether the land on the farm best suited for the purpose was chosen and whether the crop most likely to succeed was planted. The report should also state whether the crop is a total failure, and if not, the value of the portion that has been, or is likely to be, harvested. The cause of the failure must be stated and special enquiry made as to whether any negligence of the applicant in cultivation or sowing has contributed to the failure, and to what extent. It should be stated whether the requirements of the Cultivation Order are considered to have been reasonable and whether the land is likely to be profitable in subsequent years under arable culture. Each item of the claim should be reported on and a statement furnished as to whether the applicant's entire expenditure, or if not, how much of it, is likely to be unproductive.

7. **Claims for Loss other than that Above Referred to.**—The provision of the Corn Production (Amendment) Act, 1918, above set out, does not cover the whole ground of Regulation 2M, but only powers exerciseable with respect to matters dealt with in Part IV. of the Corn Production Act, 1917. Those matters are the requirement of occupiers and owners to cultivate according to the rules of good husbandry or to

* Not here printed.

change the mode of cultivating any land or the use to which it is put, and in connection therewith the termination of tenancies and the entry on land and its cultivation by the Board. From this it will be seen that claims for compensation for loss occasioned by the exercise of some of the powers under Regulation 2M still fall within the jurisdiction of the Defence of the Realm (Losses) Commission. The principal of these are claims for loss of the value of live and dead stock of which possession has been taken under Paragraph 1 (*b*) and for loss of rent of land or buildings taken for the accommodation of labour or stock, employed or used by the Board, under Paragraph 1 (*c*). It will be inconvenient for the Commission to have to adjudicate on a part only of the items commonly included in an outgoing valuation, *i.e.*, the stock, implements, etc.; and it will consequently be advisable, wherever this can be arranged, for the Agricultural Executive Committee to buy these of the dispossessed occupier rather than to take possession of these under the compulsory powers of Regulation 2M. The price at which it is proposed to buy these should be reported to the Department before being agreed.

With regard to the occupation of land and buildings used for camps and stables, the Department hope to obtain power to pay agreed rent and a further communication will be sent.

8. **Previous Instructions.**—All previous instructions issued by the Department on the preparation and forwarding of claims for compensation are hereby cancelled, with the exception of the Specimen Form of Report, F.P. 124, referred to above.

List of Circulars and Memoranda cancelled :—

Circular F.P. 43, dated 1st May, 1917.*
Memo. C.L. 4, dated 22nd June, 1917.
Memo., dated 1st October, 1917.
Circular F.P. 123 (but *not* F.P. 124), dated 23rd October, 1917.†
Memo. 11/C1, dated 2nd January, 1918.‡
Memo. 28/C1, dated 22nd February, 1918.
Memo. 37/C1, dated 19th March, 1918.

9. **Pending Claims.**—Any applications to the Losses Commission for compensation that are pending with Agricultural Executive Committees for report should be treated as in the past, and as soon as the report is completed it should be sent forward to this Department with the claim. The Department will deal with the claim on receipt of the report.

Any claims now received on the forms issued by the Losses Commission should be similarly dealt with, but a duplicate of the application need not be sent to the Commission. Applicants who have sent in such forms need not be asked to submit their claims in the new forms.

The Department are in communication with the Commission as to the disposal of cases already pending with them.

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* Printed in this *Journal*, June, 1917, p. 355.
† " " " November, 1917, p. 890.
‡ " " " January, 1918, p. 1127.

THE following Notice was issued by the Food Production Department of the Board on 30th August :—

Committee Farming. Reports continue to reach the Food Production Department showing excellent results obtained by county committees that have taken over farms in a bad condition of cultivation and have managed them during the past year or two. An instance may be mentioned from Norfolk, where the Committee in February, 1917, entered upon a farm of 350 acres, most of it in outrun leys or derelict, only 12 acres being ploughed. The farm is managed by the Executive Officer of the county, with the assistance of a bailiff. Fifty-five acres remain in permanent grass. The cropping this year is : wheat, 85 acres ; barley, 39 acres ; oats, 70 acres ; roots, 59 acres ; other crops, 41 acres. Crops are looking well and there is little doubt that the financial results of the Committee's occupation will be most satisfactory.

In another case a farm practically derelict was taken over last year, when only 50 acres out of a total of 420 were ploughed. At present there are over 400 acres under food crops—111 acres of wheat, 83 acres of barley, and 57 acres of oats. All the crops look well, and, as an official report says : "The marked general improvement effected in so comparatively short a time is an excellent illustration of the national importance and value of efficient farm management."

THE following Memorandum (No. C.L. 74/C.1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 21st August :—

Credit for Farmers. It has been represented to the Department that there are numerous cases in which it is desirable to provide a farmer with additional working capital in order to enable him to pay promptly for cultivations undertaken by the Agricultural Executive Committee. The Department have been in communication with the Treasury on the subject, and have now obtained authority for such cases to be dealt with under the Credit Scheme ; that is to say, an occupier for whom cultivations are carried out by the Committee, but who has not sufficient ready money to pay cash for those cultivations, may apply to the Committee for the grant of credit, and thus obtain an advance from his bankers to enable him to settle the Committee's account.

This concession should be of distinct advantage in those cases where an occupier who is short of working capital breaks up additional land, thereby undertaking increased financial responsibility ; and it will obviate action under Regulation 2M (1) (*a*) in many cases where it would otherwise be necessary for the Committee to enter and take possession, with a view to carrying out the cultivations and recovering the cost when the crops are harvested.

In acting on the authority now given, Executive Committees should exercise the greatest care to ensure that credit is only allowed to suitable applicants, who may be expected with the measure of assistance thus afforded to them to carry on the subsequent work of cultivation to a satisfactory conclusion.

THE following Circular Letter (No. C.L. 43/H.) was addressed to Horticultural Sub-Committees by the Food Production Department of the Board on 22nd August :—

Agricultural Organisation Society and Food Production.

SIR,—I am directed to inform you that the Agricultural Organisation Society is prepared to render assistance to this Department in the work of food production. The Society is prepared to assist the Horticultural Sub-Committees in providing allotment societies and similar organisations with information and assistance with respect to business methods, the principles of co-operation and the practice of co-operation in the purchase of horticultural requirements and owning of tools, implements, etc.

The Agricultural Organisation Society is also prepared on receipt of a request from this Department to assist counties with respect to Marketing Organisations in their counties. The Department are anxious that use should be made of the Agricultural Organisation Society in these directions, but, at the same time desire to point out to Horticultural Sub-Committees the necessity for care being taken for preventing over-lapping and duplication of work.

The Department are asking the Society to forward for the information of the Sub-Committee a detailed memorandum of its programme of work in connection with the organisation of co-operation among small cultivators.

I am, etc.,
(Signed) G. F. MIDDLETON.
For Controller, Horticultural Division.

THE following Memorandum (Ref. C.L. 250/M.6) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 17th August :—

Labour on Tractors.

It has become necessary owing to the issue of revised Regulations by the Army Council in regard to the pay of soldiers, and to the fixing of local rates by Agricultural Wages Boards, to cancel all previous instructions ; and the arrangements as to the employment of labour must in future conform to the terms of this Circular.

Payment to Existing and Future Competent Labour.—In each county where the Agricultural Wages Board have fixed rates, all soldier, civilian and women labour must be paid the minimum rate fixed for the number of weekly hours specified by such Board. This entails the abolition of the present 30*s.* rate and 60 hours per week in these counties.

Overtime in excess of the hours specified by the Board, and Sunday work, must be paid for at the rate fixed by such Board, and Sunday pay at the overtime rates, if no other rate has been fixed.

In addition a bonus not exceeding 8*d.* in the pound charged to the farmer in respect of any one tractor and implement may, at the discretion of the Committee, be paid to persons engaged on tractor work, *i.e.*, if the bonus were fixed at 3*d.* in the pound and the team consisted (*a*) of one person, the bonus payable would be 3*d.* in the pound, (*b*) of two persons, the total bonus payable would be 6*d.* in the pound, and (*c*) of three persons the total bonus payable would not exceed 8*d.* in the pound. In exercising this discretion Committees should bear in

mind the great importance of keeping their present labour as the responsibility for replacement now rests with them.

In the unlikely event of the above rates (including bonus) falling short of the minimum for soldiers, namely 12*s*. 6*d*. per week, plus board and lodging, soldiers must be paid such minimum.

If no Agricultural Wages Board rate has been fixed, the present scale will obtain until such rate is fixed, viz., 30*s*. per week, without overtime for a 60 hours week, plus bonus of 1*s*. an acre ploughed, etc., and 6*d*. per hour for Sunday work up to a maximum of 5*s*. for any day.

When a tractor is not working, every effort should be made to find other agricultural work for the labour either by hire to a farmer, to an engineer contractor, or by any other means at such rates as may be arranged by the Committee. The wages for such labour must be paid by the hirer direct to the employee, and the Committee should only pay the difference (if any) to make up such wages at the full Agricultural Wages Board minimum without bonus, or the 30*s*. per week as the case may be. When no such work is available, the minimum wage applicable must be paid in full.

It has not been found in practice that the training of men interferes with the output of the tractor, and in future the 10*s*. bonus paid for each man passed as competent will be cancelled.

Any person necessarily living more than one mile from his or her work may, at the discretion of the Committee, receive in the case of a bicycle, 1*d*. per mile for using it for travelling to and from work, or railway expenses not exceeding 3*s*. per week.

When necessarily living away from home married civilians and unmarried civilians whose homes are mainly dependent on them, may be paid a subsistence allowance of 17*s*. 6*d*. per week, and unmarried civilians whose homes are partially dependent on them, may be paid a subsistence allowance of 10*s*. 6*d*. per week. The Committee must make such enquiries as will satisfy them that the employee is entitled to the allowance, and must obtain a signed declaration from him or her to that effect. The Committee will pay the subsistence allowance to civilian tractor workers. Care must be taken that subsistence allowance is not paid twice over to men who are National Service or War Agricultural Volunteers.

Should it become necessary to dismiss labour owing to the shortage of work reference should first be made to the Department with a view to the surplus labour being transferred elsewhere. If this is not possible soldiers can then be returned to their agricultural companies; only as a last resort should civilian labour be dismissed, or women returned to county depots.

Individual applications by men or women for transfer to other counties in which they ordinarily reside will in future be arranged between the Committees of the counties concerned, but in the case of soldiers authority must be obtained from the Officer Commanding the men's Agricultural Company, and, in the case of women from the County Organising Secretary of the Women's Branch, before transfers are effected.

Learners.—Committees must make such provision for future labour as they may consider necessary, and unskilled persons engaged should be placed for tuition as second hands with Fordson tractors or third hands with other tractors. It is desirable that women undergoing tuition should be placed under the charge of other women who are

already competent and those Committees who do not at present employ women should apply to the Department for competent women before taking on learners.

Unskilled labour for training may be obtained by any of the following methods, which should be tried in the order laid down :—

(a) Application to the Local War Pensions Committee for the services of discharged soldiers and sailors.
(b) Application to the Local Employment Exchanges for War Agricultural Volunteers where all these are not enrolled by the Committee.
(c) Application to the nearest agricultural company for soldiers.
(d) Application to the Women's War Agricultural Committee.
(e) Application to the Department.

Payment for civilian, women and soldier learners (except discharged soldiers and sailors) will be the Agricultural Wages Board minimum rate without bonus until considered competent. If no such minimum has been fixed the following rates should be paid, viz., 25*s.* a week for two weeks, 30*s.* a week for two weeks, and then when competent 30*s.* a week and acreage bonus.

Discharged soldiers and sailors will be paid by the Ministry of Pensions until such time as they are taken over by the Committee as competent tractor-driver ploughmen. All information regarding the terms of employment of such men should be obtained by the Committee from the Secretary of the Local War Pensions Committee.

Any learners (except discharged soldiers or sailors paid by the Ministry of Pensions) may be paid subsistence and travelling allowances on the same terms as competent labour.

Leave.—Leave to which soldiers are entitled is laid down in Army Regulations, and particulars may be obtained from the man's Commanding Officer. During leave they will receive Army pay from their agricultural companies, and they will not therefore receive any payment from the Committee during such absence.

Civilians and women may receive six days' leave after six months' work, and thereafter six days' leave every six months. They will receive no pay during such periods and will have to pay their own railway expenses unless Committees are notified to the contrary at any future date.

Leave should only be granted when, in the opinion of the Committee, the labour can reasonably be spared.

THE following Memorandum (No. C.L. 125/L. 2) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 16th August :—

Prisoners of War. It is necessary to amplify the instructions contained in paragraph 2 of the Memorandum of the 17th July* as to Women of the Land Army and prisoners of war not being allowed to work on the same farm :—

(*a*) It must be an invariable rule that women of the Land Army are not to be sent to farms where prisoners are boarded and lodged with the farmer under Scheme B. In the same way prisoners must not be sent to farms under Scheme B, if Land Army women are employed.

(*b*) In cases where a woman of the Land Army is employed by a farmer as a stock-woman or milker, etc., a Committee may allow the

* Printed in this *Journal*, August, 1918, p. 592.

armer to have a gang of prisoners daily from a depot for work in the ields, provided that care is taken to ensure that the prisoners are mployed on a different part of the farm from that where the Land Army woman is engaged.

(c) As regards gang labour of both types, it is always undesirable hat gangs of Land Army women and gangs of prisoners should work on the same farm; but where labour cannot otherwise be provided it nay be permitted, provided that during the time the prisoners are on he land they are kept entirely apart from the women of the Land Army.

THE following Memorandum (No. C.L. 123/L.1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 8th August:—

Stud Employees. In view of the importance attached by the War Office to the maintenance of the light horse breeding industry, the Department have been in communication with the Ministry of National Service with a view to stud employees generally, not merely stallion men and leaders, being certified on the authority of the Board of Agriculture and the Ministry of National Service under paragraph 9 of the Schedule to the Military Service (Agricultural Exemptions) Order, 1918, as being engaged in an occupation of national importance in connection with agriculture.

Pending a final decision in the matter, the Ministry of National Service have agreed that provisional vouchers may be issued by Agricultural Executive Committees in cases of urgency in order to retain the services of men who may be regarded as essential. In any cases of stud employees which come to the notice of Agricultural Executive Committees, provisional vouchers may be issued until further instructions have been received from the Department.

THE following Memorandum (No. C.L. 128/L.1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 26th August:—

Agriculturists and the Volunteer Force. Representations have recently been made to this Department as to the position of agriculturists who are members of the Volunteer Force either by voluntary enlistment or by instructions from tribunals. Under the Agricultural Exemptions Order, 1918, Agricultural Executive Committees are now the authorities responsible for the exemption from military service of men engaged in agriculture and allied trades and the following information on the subject is, therefore, furnished for their guidance.

Agricultural Executive Committees have no power to release men from their obligation to attend drills in accordance with their agreements when joining the Volunteer Force, nor may they at present make it a condition, when issuing a voucher under the Order, that the holder must join the Volunteer Force.

As regards the release of agriculturists from the Volunteer Force, the Department have been in communication with the War Office, and it is agreed that in any case where it is impossible for a man to attend drills without serious interference with his civil work, the man should make representations to his Commanding Officer. Any application by an agriculturist for release from his Volunteer obligations should be

supported by the Agricultural Executive Committee, if they are satisfied that the application is genuine and that the man's work is adversely affected by his liability to drill. If put forward in this way an application for release will be carefully and sympathetically considered.

It is suggested that when representations are made by agriculturists to the Agricultural Executive Committees the above procedure should be adopted.

THE following Memorandum (No. C.L. 247(*a*)/M.3), was issued by the Food Production Department of the Board on 15th August :—

Repairs to Steam Ploughing and Threshing Tackle, Farm Vehicles, and Agricultural Machinery.

The following procedure has been arranged in connection with the issue of priority certificates for the repair of steam ploughing and threshing tackle, farm vehicles and agricultural machinery :—

The actual owner must apply to the Agricultural Machinery Department, Ministry of Munitions, 8, Northumberland Avenue, London, W.C. 2, giving a detailed list of engines, machines, or vehicles in his possession, stating type and maker's name in each case. This list may include any of the following :—

(*a*) Ploughing engines and tackle, threshing engines (not stationary), threshing machines and tackle, farm vehicles, reapers, binders, or mowing machines.

(*b*) Any other vehicles or engines running on wheels, not exclusively used for farm purposes.

On receipt of this information, the Agricultural Machinery Department will ask the Priority Department to grant the owner a *running permit which will enable him to have any ordinary repairs done at any time, and when such permit has been granted a separate application need only be made in the case of a repair to any one engine, machine, or vehicle which would cost over £20 (twenty pounds).*

When boiler tubes are required, the exact number and specification must be given in each case.

It is advisable that owners should make application to the Agricultural Machinery Department at once for such priority certificates, and not wait until some repair is necessary.

Repairs to fixed machinery and plant are dealt with under a separate General Maintenance Permit, and application for this should be made direct by the owner of the plant, whether he be a farmer or an engineer, to the following address :—Ministry of Munitions, Priority Department, General Maintenance Section, 1, Caxton Street, S.W. 1.

THE following information (Ref. No. C.L. 194/L.3) was circulated by the Director of the Women's Branch of the Food Production Department of the Board in August :—

Money for Land Army Girls while Travelling.

It has been brought to notice that members of the Land Army sent out from training centres, gang hostels, and depots to work in other counties frequently travel without any money. Even if arrangements have been made for them to be met, this constitutes a grave danger, as having no money of their own, they are liable to accept hospitality from strangers. To meet this difficulty it is suggested that :—

(1) *Training Centres.*—The second 4*s.* pocket money to which women are entitled for the last two weeks of their six weeks' training, should be given on the day they leave, in order that they may start with money in their pockets.

(2) *Gang Hostels.*—Women leaving gang hostels should be paid for their last week's work on the last day for the same reason.

(3) *Depots.*—The question of girls leaving depot is more difficult, but it is suggested that they should in every case be asked to deposit a small sum of money, say 2*s.*, to be returned to them on leaving, or if a temporary day's work can be obtained for them they should be paid for this on the day they leave the depot.

THE following information was issued by the Food Production Department of the Board towards the end of August:—

Harvesting Sunflower Seed.

In a fine autumn sunflower seed will ripen in the open, but care must be taken to protect it from birds and to prevent the ripe seed from falling on the ground. A small piece of muslin should be tied over each head, if the planting is small. When the head shrivels and the seeds are ripe, the plants should be cut at the ground level, standing them with their heads uppermost like shocks or sheaves of corn. When the heads are thoroughly dry, they should be cut off and the remaining seeds threshed out by standing each head on its side and hammering it with a mallet. If the weather is dull or wet the ripening should be hastened by cutting the plants at ground level as soon as the seeds are plump. They should then be stood shock-wise, if possible, under cover in an outside house, barn, or room. Later, when the heads shrivel, they should be cut and dried off in an oven and the heads placed in single layers on the shelves of the oven in the evening, leaving the door slightly open. They should be removed when the fire is made up in the morning and replaced in the evening. When the heads are dry, the seeds should be threshed out and stored in bags in a dry place.

On large plantations, birds should be scared away by any of the usual methods. When the seed is plump, the plants should be cut at ground level and stacked in shocks or sheaves with the heads uppermost. If the weather is fine the sheaves may be kept in the open; if wet, under cover in a well ventilated place. If a kiln or hop-oast is available, it may be used for finishing off the drying, but if the seeds are exposed to a high temperature they will be useless for next year's sowing.

THE following Notice was issued by the Food Production Department of the Board towards the end of August:—

Seed Potato Supply.

Although the Food Production Department will not continue to supply ordinary seed potatoes next season it will assist growers to obtain seed of certain of the less common immune varieties, among others "Edzell Blue"—a first early variety immune from wart disease. The Department this year arranged for the growing in Scotland of a quantity of "Edzell Blue" to be reserved for growers in infected areas of England and Wales. The Department will not carry out the distribution itself, but will merely supply forms which can be obtained free on application (to 72, Victoria Street, S.W. 1); and growers desiring

the seed must fill up these forms and send them to the firm acting as agents for the Department. All arrangements must be made with this firm regarding delivery, terms of payment and other details. In the first instance, it is intended that the agents of the Department shall deal with the trade; and orders will not be accepted for less than two tons or more than four tons. The seed will be available to the public through the ordinary retail channels or co-operative societies who hold the necessary licence, and small growers should make a point of putting in their orders at once. There is a special reason for this in the case of a potato like "Edzell Blue," which will not stand pitting well and should normally be boxed in the autumn as soon as possible after lifting. Very few small gardeners or allotment men will be planting more than seven to fourteen pounds of this variety next Spring, and they should get their seed at the earliest possible moment and sprout it in a box or on the floor of a cool, frost-proof room. If they do not take this advice they may be disappointed of their supply because the percentage of loss on "Edzell Blue" in store or clamp is so high that neither the farmer nor the merchant will be prepared to carry a large stock through the winter.

Prices of Seed Potatoes.

THE Food Controller is advised by the Boards of Agriculture for England and Wales and Scotland that it is not desirable in the interests of food production that the price of seed potatoes of first early varieties should be controlled. The Food Controller, therefore, does not propose to prescribe maximum prices for such seed potatoes. (*National Food Journal*, 28th August, 1918.)

The Potatoes (1918 Crop) (Restriction) Order, 1918.

AN Order (No. 1044), dated 22nd August, 1918, has been made by the Food Controller to the effect that:—

1. Except under and in accordance with the terms of a licence granted by or under the authority of the Food Controller, a person shall not on or after 31st August, 1918, either on his own behalf or on behalf of any other person sell or buy or offer to sell or buy any potatoes of the 1918 crop grown in Great Britain otherwise than for delivery before the 1st November, 1918.

2. This Order shall not apply to potatoes of the first early varieties.

NOTE.—Applications for licences under the above Order should be addressed to the Secretary, Ministry of Food (Potato Section), 100, Cromwell Road, London, S.W.7.

The Potatoes Order, 1918.

AN Order (No. 979), dated the 2nd August, 1918, has been made by the Food Controller to the effect that:—

1. Except under and in accordance with the terms of a licence granted by the Food Controller a person shall not on or after the 8th August, 1918, until further notice either on his own behalf or on behalf of any other person, buy, sell, or deal in or offer to buy, sell, or deal in any potatoes of the variety "King Edward" of the 1918 crop grown in England or Wales.

2. A person shall not on or after the 8th August, 1918, sell or offer or expose for sale, or buy or offer to buy potatoes otherwise than by weight.

3. Clauses 1 and 2 of this Order shall not apply to sales of potatoes in the ground.

THE SCHEDULE.

Order Revoked.	Extent to which Revoked.	Date at which Revoked.
The Potatoes Order, 1917, as amended. (S.R. & O. Nos. 949 and 998 of 1917 and Nos. 445 and 639 of 1918.)	Part I except Clauses 1, 2, 4, 5 and 6. Part III, the whole. Part IV, the whole. The 1st and 2nd Schedules.	8th August, 1918.
The Seed Potatoes (1917 Crop) Order, 1917, as amended. (S.R. & O. Nos. 1155 of 1917 and 138 of 1918.)	The whole Order.	8th August, 1918.
The Potatoes (Distribution) Order, 1918. (S.R. & O. Nos. 94 and 204 of 1918.)	The whole Order.	2nd August, 1918.
The Potatoes (Distribution) Order, No. 2, 1918. (S.R. & O. No. 617 of 1918.)	The whole Order.	2nd August, 1918.

THE following Notice was issued by the Food Production Department of the Board on 30th August :—

Reports on Potato Spraying.

A large number of interesting reports have already been received by the Food Production Department as to the effects of spraying the potato crop. Generally, where spraying has been done once only the crop has been attacked with disease if adjoining crops were affected ; but where two or three sprayings had been given the results in the large majority of cases have been excellent.

A number of firms this year have been pushing vigorously the sale of various proprietary mixtures ; and from time to time the Department has been asked whether it can recommend one or other of these mixtures. Broadly, the experience of the present season so far endorses the wisdom of the official refusal to advise the use of any but the official mixture—Burgundy or Bordeaux. Several experimentalists with certain proprietary mixtures have written to the Department complaining of their ineffectiveness. Burgundy or Bordeaux mixture certainly appears to give a much larger measure of protection than any of the other mixtures with respect to which reports have so far been received. Dealing with one of the latter mixtures, a Pembrokeshire report declares that, although it was applied by the local Council, it is "useless." From Hampshire it was reported that another mixture was easily washed off by rain, and that its efficacy compared badly with 1 per cent. Burgundy mixture used on adjoining plots. These are sample reports from a considerable budget. On the other hand where Burgundy or Bordeaux has been intelligently used the benefits are almost invariably very marked.

AN Order (No. 1,090), dated 31st August, 1918, has been mac by the Food Controller to the effect that :—

The Grain (Prices) Order, 1918.

1. *No wheat, rye, oats or barley harveste* in the United Kingdom in the year 1918, c tailings, dressings or screenings of any suc grain may be sold at prices exceeding th maximum prices applicable according to the provisions of this Order.

2. (*a*) (i.) The maximum price applicable on any transaction shal subject as hereinafter provided, be a price at the rate specified in th following table :—

Date of Sale of *Grain Sold.*	Wheat and Rye Rate per Qr. of 504 lb.		Barley Rate per Qr. of 448 lb.		Oats Rate per Qr. of 336 lb.	
	s.	*d.*	*s.*	*d.*	*s.*	*d.*
Where sale is made before the 1st October, 1918, the price shall not exceed	75	6	67	0	47	6
Where sale is made in the month of October, 1918, the price shall not exceed	75	6	67	0	48	0
Where sale is made in the month of November, 1918, the price shall not exceed	75	6	67	0	48	6
Where sale is made in the month of December, 1918, the price shall not exceed	75	6	67	0	49	0
Where sale is made in the month of January, 1919, the price shall not exceed	76	0	67	0	49	6
Where sale is made in the month of February, 1991, the price shall not exceed	76	0	67	0	50	0
Where sale is made in the month of March, 1919, the price shall not exceed	76	0	67	0	50	6
Where sale is made in the month of April, 1919, the price shall not exceed	76	6	67	0	51	0
Where sale is made in the month of May, 1919, the price shall not exceed	76	6	67	0	51	6
Where sale is made on or after the 1st June, 1919, the price shall not exceed	76	6	67	0	52	0

(ii.) Where any grain is carried without railway transport direc *from producer's premises to mill or miller's store near such mill, or t* factory or manufacturer's store near such factory, for the purpose o manufacture in such mill or factory, the rate specified in the foregoin table shall be increased by 1*s.* per quarter. For the purpose of thi Sub-clause no mechanical processes of a kind referred to in Clause of this Order (except the drying of barley by kiln-drying or othe mechanical process) shall be deemed to be manufacture.

(*b*) The rate per quarter during any period according to Sub clause (*a*) of this Clause, is hereinafter called "the standard rate."

3. Where oats suitable for the manufacture of oatmeal, rolle oats, flaked oats, oat-flour, *or other oats products for* human con sumption are bought by an oatmeal miller, or other manufacturer

specifically for the purpose of such manufacture, or by a recognised dealer buying for the purpose of filling a specific order given in writing by such a miller or such a manufacturer, the maximum price shall be ascertained by adding 3*s*. per qr. to the standard rate.

4. (*a*) In the case of wheat, rye and barley so damaged as to be unfit for use in the manufacture of human food and wheat, rye and barley tailings, dressings and screenings which are unfit for use in the manufacture of human food, the maximum price shall be ascertained by deducting 7*s*. per qr. from the standard rate.

(*b*) In the case of oats improperly cleaned or containing an undue quantity of soil, and in the case of oats tailings, dressings and screenings, the maximum price shall be ascertained by deducting 5*s*. per qr. from the standard rate.

5. On the occasion of the purchase of any of the grain mentioned from any person who is a recognised dealer in grain and who is not the producer of the grain sold, the maximum price shall be ascertained by adding 1*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order; provided that where the total quantity of the kind of grain purchased by one buyer from one seller does not, in any period of seven consecutive days, including the day of sale exceed 7½ qr., the maximum price in respect of each quarter so purchased shall be ascertained by adding 5*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order, and where such total quantity does not in that period amount to half a quarter the maximum price in respect of such sales shall be ascertained by adding 9*s*. per qr. to the price otherwise applicable according to the foregoing provisions of this Order.

6. (*a*) The maximum prices under this Order are fixed on the basis of the following terms and conditions being applicable to the transaction:—

(i.) Payment to be net cash within seven days of completion of delivery, and monies then unpaid thereafter to carry interest not exceeding the rate of 5 per cent. per annum or Bank Rate, whichever shall be the higher;

(ii.) The grain to be delivered by the producer free on rail or barge, or to mill or store in accordance with the usual custom of the district;

(iii.) Any freight, haulage, porterage and cartage incurred after delivery in accordance with sub-clause (ii.) of this Clause to be for buyer's account.

(iv.) All sack hire up to and including the time of delivery to rail, barge, mill or store by the producer to be for the producer's account, and all charges for sacks subsequent thereto to be for the buyer's account.

(*b*) Where the grain is sold on terms and conditions other than the terms and conditions stated in the foregoing part of this Clause, a corresponding adjustment shall be made in the maximum price. In particular:—

(i.) Where grain is delivered by the producer to a distance greater than the distance corresponding with the usual custom of the district, a sum at the rate of 9*d*. per ton per mile for the extra distance shall be added to the maximum price.

(ii.) Where the grain is delivered by the producer at his premises a sum at the rate of 9*d*. per ton per mile for the distance corresponding with the usual custom of the district shall be deducted from the maximum price.

7. On the occasion of a sale of any home-grown grain which has been mechanically treated by gristing, crushing, bruising, kibbling, splitting or other kindred process, or which has been kiln dried or dried by other mechanical method, the maximum price shall be ascertained by adding to the price otherwise according to the foregoing provisions of this Order, the cost of such treatment not exceeding a usual and reasonable charge.

8. A person shall not sell or buy or offer to sell or buy any of the grain mentioned at a price exceeding the maximum price applicable under this Order, or in connection with a sale or disposition or proposed sale or disposition of any such grain enter or offer to enter into a fictitious or artificial transaction or make or demand any unreasonable charge.

9. None of the foregoing provisions of this Order shall apply to any grain suitable for seed and sold specifically for the purpose of seed, in compliance with the provisions of the Testing of Seeds Order, 1918.* No grain so sold shall be used for any other purpose, and the buyer of any grain so sold shall (except where he is buying the grain for use as seed by himself) hand to his seller at the time of sale, a declaration signed by him that he will re-sell the grain specifically as and for the purpose of seed.

10. A person shall not sell or offer to sell any wheat, rye, oats or barley whether imported or home-grown otherwise than by weight.

11. A person shall not torrefy or bleach any wheat, rye, oats or barley, whether imported or home-grown.

12. For the purpose of this Order :—

"Qr." shall mean in relation to wheat and rye a weight of 504 lb., in relation to barley a weight of 448 lb., and in relation to oats a weight of 336 lb.

"Recognised dealer" shall mean a person who in the ordinary way of business deals in grain for the purpose of his livelihood.

"Unfit for use in the manufacture of human food" shall mean grain which is so damaged or so inferior in quality that any flour or meal which could be milled therefrom would be unfit for use in human food.

Arrangement for 1918 Onion Crop.

THE Food Controller has been in consultation with the Board of Agriculture and Fisheries regarding the 1918 Onion Crop. In view of high freights and restrictions in shipping, it is extremely important that the home production of onions should be increased very largely and up to the fullest extent which the supply of seed will allow. In order that the grower may be ensured an adequate return for his crops, the Food Controller announces that, in the event of it becoming necessary to fix any maximum growers' prices for the British Onion Crop of 1918, those prices will not be less than those indicated in the following scale :—

For delivery on or before 30th October, f.o.r. or f.o.b.	£15 0s. per ton.
For delivery between 1st November and 31st December, f.o.r. or f.o.b.	£16 10s. ,,
For delivery from 1st January to end of season f.o.r. or f.o.b.	£18 0s. ,,

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* Printed in this *Journal*, July 1918, p. 477.

AN Order (No. 1,029), dated the 15th August, 1918, has been made y the Food Controller to the effect that :--

The Cereals (Restriction) Order, 1918.

1. This Order shall apply to the following articles, namely, wheat, rye, barley, dredge corn, and to tailings, dressings and screenings of wheat, rye, barley and dredge corn.

2. (*a*) A person shall not on or after the st September, 1918, sell or offer to sell any article of a kind to which is Order applies to any person other than :—

(i.) A miller buying for the purposes of a controlled flour mill ; or

(ii.) A recognised dealer in grain ; or

(iii.) A person requiring and holding a licence granted by or under the authority of the Food Controller for the purpose of entitling him to use the article for a manufacturing business carried on by him ; or

(iv.) In the case of grain which is suitable for seed, a person buying grain specifically for the purpose of seed.

(*b*) This clause shall not apply to any article in respect of which it proved that at the time of sale it was unfit for use in the manufacture human food.

3. (*a*) A person shall not on or after 1st September, 1918, sell or fer to sell any article to which this Order applies which is unfit for se in the manufacture of human food in a quantity of 10 cwt. or less, less a certificate has been granted by or under the authority of the ood Controller to the effect that such article is unfit for use in the anufacture of human food.

(*b*) Where any certificate is granted to any person in respect of y such article, conditions may be attached to such certificate relating the keeping of records and making of returns by that person, as to e persons to whom such article may be sold ; and as to the use to hich such article may be put.

It shall be the duty of all persons concerned to comply with such nditions.

4. (*a*) Notwithstanding any provisions contained in the Orders entioned in the Schedule to this Order, a person shall not, on or after e 1st September, 1918, except under and in accordance with the rms of a licence in writing granted to him by or under the authority the Food Controller :—

(i.) Use or permit to be used any tailings, dressings or screenings of wheat, rye, barley, or dredge corn for animal food or for the manufacture of animal food ; or

(ii.) Use or treat or permit to be used or treated any wheat, rye, barley, or dredge corn for any purpose other than the purpose permitted by the said Orders for sound articles of the like kind.

(*b*) Nothing in this clause shall apply to the use or treatment of any ticle by or on behalf of a person who has bought such article in a antity of 10 cwt. or less, sold in accordance with Clause 3 of this der.

(*c*) Any licence granted under this Order may be granted subject such terms and conditions as the Food Controller shall think fit.

5. A person authorised by or under the authority of the Food ntroller may :—

(*a*) Enter any premises on which he suspects any article to which this Order applies to be ; or

(*b*) Inspect and take samples of any such article ; or

(*c*) Demand from any person in possession of or having control of any such article production of any certificate or licence granted under this Order, or any document referred to in any such licence.

Grain unfit for Human Consumption.—The Order forbids the feeding of grain of the kinds described above to any animal, unless a licence has been obtained. Exception is made in the case of persons buying unfit grain for this purpose in lots of 10 cwt. or less. In such cases the person selling the grain is responsible for getting a certificate of its unfitness before he sells it.

How to get a Certificate or Licence for Unfit Grain.—A farmer or other person wanting to *sell* grain that is unfit for human consumption in quantities of 10 cwt. or less should obtain a form of application (Form G. 1.) for a certificate from :—

(i.) The Local Food Office ; or

(ii.) The Grain Officer at the Corn Exchange, or Grain Market, on recognised market days ; or

(iii.) The Divisional Food Commissioner, or a Grain Officer authorised by him.

These forms can be obtained (and returned) personally or through the post.

Persons proposing to sell grain that is unfit for human consumption in quantities exceeding 10 cwt. need not obtain a certificate.

Farmers or other persons wanting to *feed* grain that is unfit for human consumption to animals (except when they have bought such grain in a lot of 10 cwt. or less) must obtain in the same way a form of application (Form G. 2.) for a licence.

Every application must be accompanied by a sample of the grain in question. Each sample must be in an ordinary unglazed sample bag with the name and address of the applicant, the quantity and description of the bulk to which the sample relates, and the date of the application clearly written either on the bag itself or on a label securely attached to it. The Ministry of Food is obtaining a supply of bags for this purpose, and these will be issued to Grain Officers as soon as they are delivered by the manufacturers. As a further safeguard a slip of paper containing applicant's name and details of the grain should, if possible, be enclosed inside the bag with the grain.

The Food Controller trusts that farmers will recognise that this Order is made in view of a grave national need, and that they will assist him by loyally observing its provisions. In securing its observance he desires to cause as little inconvenience to farmers as possible. He is making, through the Divisional Food Commissioners, arrangements for the prompt grant of certificates and licences. If in any district farmers experience difficulty in getting their applications dealt with, they are asked to write and tell their Food Commissioner.

NOTE.—Copies of the leaflet may be obtained free of charge and post free on application to :—*The Secretary, Joint Committee of the Board of Agriculture and Ministry of Food, 6a, Dean's Yard, Westminster, S.W. 1*, and envelopes so addressed need not be stamped.

THE following Order, dated 30th July, 1918, has been issued by the Army Council under the Defence of the Realm Regulations :—

Prohibition of the Lifting and Use of Hay and Straw in England and Wales.

In pursuance of the powers conferred on them by the Defence of the Realm Regulations and of all other powers thereunto enabling them the Army Council hereby give notice that all hay and threshed hay, oat straw and wheat straw, rivet wheat straw,

buckwheat straw, barley straw, mustard straw, rye straw, pea straw, bean straw and threshed tares (hereinafter in this Order referred to as hay and straw forage) now standing in bulk in England and Wales or as and when harvested, except such hay or straw of the 1917 or earlier crop as has been released by sale licence, is taken possession of by the Army Council and shall from the date of this Order, or as and when harvested, be held at the disposal of the duly authorised officers of the War Department.

2. Producers and consumers having hay and straw forage in their possession at the date of this Order may continue (subject as regards producers to the provisions of paragraph 3 hereof) to use a reasonable quantity of such hay and straw forage for consumption by stock in their possession or under their control.

3. Every producer desirous of using hay and straw forage in his possession for consumption by stock in his possession or under his control must forthwith make application in writing to the District Purchasing Officer for Supplies of the county in which the hay and straw forage is situate for such hay and straw forage to be inspected with a request that a producer-consumer's licence may be issued to him for such quantity thereof as he may require for consumption by stock in his possession or under his control for the period ending the 30th September, 1919. Such application must state (*a*) the description and estimated quantity of hay and straw forage in the applicant's possession, and if it is standing in ricks or bays the number of such ricks or bays and the approximate tonnage of each, (*b*) the description of hay and straw forage and the estimated quantity of each description he will require for consumption by stock in his possession or under his control, (*c*) the number and description of stock in his possession or under his control.

4. Until inspection has been made and the application for a producer-consumer's licence has been finally disposed of the producer may continue to use a reasonable amount of hay and straw forage in his possession for consumption by stock in his possession or under his control.

5. Any producer-consumer's licence shall be liable to revision on and after the 15th April, 1919.

6. All hay and straw forage in the possession of the producer for which a producer-consumer's licence has not been issued as aforesaid will be taken by the Army Council.

7. (*a*) Should any producer consider that the quantity of hay and straw forage allowed by any producer-consumer's licence for his own consumption is insufficient for his needs he may appeal by a written notice within 14 days of the issue of such licence to the Farm Produce County Committee of the county in which the hay and straw forage is situate whose decision shall be final, or (*b*) should any producer consider in the case of hay and straw forage in respect of which the price offered to him is less than any fixed price above which the sale thereof is prohibited by virtue of the Defence of the Realm Regulations or any Order made thereunder that the price offered to him is inadequate he may either (i.) appeal by written notice within 14 days of such price being offered to the Farm Produce County Committee of the county in which the hay and straw forage is situate whose decision shall be final, or (ii.) obtain the decision (in default of agreement) of the tribunal by which claims for compensation under the Defence of

the Realm Regulations are in the absence of any express provision to the contrary determined in accordance with the provisions of Regulations 2B of the said Regulations.

8. All hay and straw forage taken by the Army Council will be taken upon the terms of a Purchase Note to be signed by the producer, and where such Purchase Note is signed by the producer at the time of taking, interest at certain rates as set out in the Purchase Note will be added to the price stated thereon. In the event of a producer refusing or neglecting to sign such Purchase Note such interest will not be payable, except that where a producer has appealed to the Farm Produce County Committee as provided in paragraph 7 (*b*) of this Order and the Farm Produce County Committee has upheld his appeal, he shall receive interest as aforesaid as though the appeal had not been made or the signature had not been withheld.

9. No person may deal in hay and straw forage without a licence. Application for such licences must be made to the Civil Supplies Central Control Council through the County Distributing (Forage) Committee.

10. All consumers (other than producers) must register with one or more dealers or producer-distributors, and when applying to register with any dealer or producer-distributor must state (*a*) the number of animals for which hay and straw forage is required, (*b*) the classification of such animals, (*c*) the description and quantity of each description of hay and straw forage required, and (*d*) the place at which it is required.

Should the number of animals in the consumer's possession increase or decrease after registration such increase or decrease must be notified by him to the dealer or producer-distributor concerned.

11. All persons requiring straw for thatching (except in the case of a producer), packing, paper manufacturing or any other purpose whatsoever other than consumption by animals must make application to the County Distributing (Forage) Committee of the county concerned, stating (*a*) the description and quantity of straw required, (*b*) the purposes for which it is required, (*c*) the place at which it is required, and (*d*) the name and address of the person from whom it is desired to obtain supply.

12. All licences issued under this Order will be issued subject to the conditions and restrictions contained in such licences. Any departure from such conditions and restrictions or other act in contravention of the provisions of this Order will be an offence under the Defence of the Realm Regulations, and will render the offender liable to the penalties attaching thereto.

13. Detailed instructions regarding the necessary procedure to be adopted by all persons desiring to use, sell, purchase or otherwise deal in hay and straw forage under this Order can be obtained upon application to the Secretary of the Forage Committee, 64, Whitehall Court, S.W. 1.

14. The addresses of the District Purchasing Officers for Supplies, mentioned in paragraph 3 are as under :—

Bedfordshire, 24, Rothesay Road, Bedford.
Berkshire, 1, Station Road, Reading.
Buckingham, Winslow House, Buckingham Street, Aylesbury.
Cambridgeshire, 90, Regent Street, Cambridge.
Cheshire, 14, Old Bank Buildings, Chester.
Cornwall, 68, Lemon Street, Truro.

Derbyshire, 12, Strand Chambers, Derby.
Devonshire, 22, Southernhay West, Exeter.
Dorset, 2, Cornwall Road, Dorchester.
Durham, Joint Stock Bank Chambers, Bondgate, Darlington.
Essex, 18A, Broomfield Road, Chelmsford.
Gloucestershire, 5, St. George's Chambers, George Street, Gloucester.
Hampshire, 45, Southgate Street, Winchester.
Herefordshire, 34, Broad Street, Hereford.
Hertfordshire, 43, Victoria Street, St. Albans.
Huntingdonshire, St. George's House, St. George's Street, Huntingdon.
Kent, Ashford West Station, Kent.
Lancashire, 65, Hoghton Street, Southport.
Leicestershire, 8, New Street, Leicester.
Lincolnshire, 5, Broad Street, Spalding.
London and Middlesex, 5, The Broadway, Harrow.
Norfolk, 11, Thorpe Road, Norwich.
Northamptonshire, 2A, Guildhall Road, Northampton.
Northumberland, 33, Sand Hill, Newcastle-on-Tyne.
Nottinghamshire, 1, Thurland Street, Nottingham.
Oxfordshire, York House, St. Aldates, Oxford.
Shropshire, 22, Talbot Chambers, Market Street, Shrewsbury.
Somerset, 63, High Street, Taunton.
Staffordshire, New Sorting Office, Newport Road, Stafford.
Suffolk, Tower Chambers, Tower Street, Ipswich.
Surrey, "Drakecliffe," Portsmouth Road, Guildford.
Sussex, 18, Cromwell Road, Hove.
Warwickshire, 61, Warwick Street, Leamington.
Westmorland and Cumberland, The Corn Market, Penrith.
Wiltshire, 12, Market Place, Devizes.
Worcestershire, 14, Pierpont Street, Worcester.
Yorkshire, 72, Bootham, York.
S.E. Wales, Blands Store, Dumball's Road, Cardiff.
N.E. Wales, 4, Grosvenor Road, Wrexham.
S.W. Wales, The Unionist Club, Lammas Street, Carmarthen.
N.W. Wales, The Old Recruiting Office, Water Street, Menai Bridge.

15. The address of the Civil Supplies Central Control Council nentioned in paragraph 9 is as under :—47, Victoria St., London, S.W. 1.

16. The addresses of the County Distributing (Forage) Committees nentioned in paras. 9 and 11 are as under :—

Bedford, 11, St. Paul's Square, Bedford.
Berkshire, Blagrave Street, Reading.
Buckinghamshire, 69A, Buckingham Street, Aylesbury.
ambridge, *Isle of Ely,* Geneva House, Regent Street, Cambridge.
heshire, 49, Lancaster Avenue, Fennel Street, Manchester.
ornwall, Trisprison, Helston, Cornwall.
umberland, 35, Castle Street, Carlisle.
erby, 6, Green Lane, Derby.
evonshire, 17, Bedford Circus, Exeter.
orset, 3, Napier Terrace, Dorchester.
urham, 25, Pilgrim Street, Newcastle-on-Tyne.
ssex, 100, Palmerston House, Broad Street, *London,* E.C.
loucester, 130-160, Cricklade Street, Cirencester.
ampshire, 42, Bridge Street, Andover.
ereford, 34, Broad Street, Hereford.
ertfordshire, Chequer Street, St. Albans.
untingdon, St. George's House, St. George's Street, Huntingdon.
Kent, 19, Bank Street, Ashford.
Lancashire, 18, Shudehill, Manchester.
Leicester and Rutland, 32, Halford Street, Leicester.
Lincoln, Wigford House, High Street, Lincoln.
London and Middlesex, 24, Corn Exchange Chambers, Seething Lane, London, E.C.
Monmouth, Gaer Fach, Newport, Monmouth.
Norfolk, Quay Side, Norwich.
Northampton, 2A, Guildhall Road, Northampton.
Northumberland, 5, Pilgrim Street, *Newcastle-on-Tyne.*
Nottingham, 25, Castle Gate, Newark-on-Trent.
Oxford, York House, St. Aldates, Oxford.
Shropshire, 83, Wyle Cop, Shrewsbury.
Somerset, Bank Chambers, 54, North Street, Taunton.
Stafford, 43, Greengate Street, Stafford.
Suffolk, Tower Chambers, Ipswich.
Surrey, Piccards House, Bridge Street, Guildford.
Sussex, 1A, Cromwell Road, Hove.

Warwick, Carlton House, 28, High Street, Birmingham.
Westmorland, c/o. Jackson Dawson, Esq., Appleby, Westmorland.
Wiltshire, Bank Chambers, Devizes.
Worcester, Vine Street, Evesham.
Yorkshire, 44, Queen Anne's Road, York.
N.E. Wales, Caia Stores, Mount Street, Wrexham.
S.W. Wales, 50, Plymouth Street, Swansea.
N.W. Wales, Cefni Chambers, Llangefni, Anglesey.
S.E. Wales, 98, Queen Street, Cardiff.

17. The addresses of the Farm Produce County Committees mentioned in paragraphs 7 and 8 are as under :—

Bedfordshire, Henry Swaffield, Surveyor, Ampthill.
Berkshire, W. Chillingworth, 39, Blagrave Street, Reading.
Buckinghamshire, G. H. Manning, 12, Temple Square, Aylesbury.
Cambridgeshire, A. E. Saunders, Waterbeach, Cambridge.
Chester, James Sadler, 62, Nantwich Road, Crewe.
Cornwall, H. Rosewarne, Princes Street, Truro.
Cumberland, J. W. Watt, The Viaduct, Carlisle.
Devon, W. W. Beer, 17, Bedford Circus, Exeter.
Derby, W. E. Cox, Elmton Park, Chesterfield.
Dorset, W. G. Miles, 6, South Street, Dorchester.
Durham, Miss Dorothy Parlour, 6, Arden Street, Darlington.
Essex, A. F. White, 17, Duke Street, Chelmsford.
Gloucester, Thomas Bradford, 5, St. George's Chambers, George Street, Gloucester.
Hampshire, Percy Shenton, 41, Jewry Street, Winchester.
Hereford, W. G. C. Britten, 20, East Street, Hereford.
Hertford, W. Young, 4, St. Peter's Street, St. Albans.
Huntingdon, B. P. Carter, Barclay's Bank, Huntingdon.
Kent, E. L. Gardner, 69, Castle Street, Canterbury.
Lincoln, G. E. Nettleship, Auctioneer, Saltergate, Lincoln.
Lancashire, T. H. Holborn, County Chambers, Fishergate, Preston.
Leicester and Rutland, Geo. Attenborough, 6, Friar Lane, Leicester.
London and Middlesex, A. L. Perkins, Greenford Green, Middlesex. (Chairman).
Monmouth, W. Homfray Davies, Tredegar Chambers, Bridge Street, Newport, Monmouth.
Norfolk, A. R. Harrison, 16, Eaton Road, Norwich.
Northampton, T. C. Woods, 2, Derngate, Northampton.
Nottingham, W. H. Bradwell, Thurland Street, Nottingham.
Northumberland, A. J. Hargrave, Newcastle Farmers' Club, The Collingwood, Newcastle-on-Tyne.
Oxford, J. G. Abraham, Chadlington, Charlbury. (Chairman.)
Shropshire, Alfred Mansell, College Hill, Shrewsbury.
Somerset, W. L. Price, 3, Hammet Street, Taunton.
Soke of Peterborough, W. Stock, Bedgeny Road, March, Cambridgeshire.
Stafford, C. F. South, Bank Passage, Stafford.
East Suffolk, A. Collings, Esq., 86, Princes Street, Ipswich.
West Suffolk, John H. Bonner, Guildhall Street, Bury St. Edmunds.
Surrey, H. E. Fenn, 94, Woodbridge Road, Guildford.
Sussex, E. P. Weller, c/o J. C. Robinson, Esq., Iford, Lewes.
Warwick, Phillip Pallant, 23, Albert Street, Rugby.
Westmorland, H. S. Hodgson, 22A, Highgate, Kendal.
Wiltshire, A. M. Marles, Watergate, House, Bulford, Wilts.
Worcester, A. G. Griffiths, Auctioneer, 70A, Broad Street, Worcester.
Yorkshire, F. Arey, Davyhall Chambers, Davygate, York.
N.W. Wales, D. H. Davies, Rorsedd, Fawr, Chwilog, S.O., Carnarvon.
N.E. Wales, T. G. Lewis, Brynyorkon, Caergwrle, Wrexham. (Chairman)
S.E. Wales, H. Jones-Davies, Glyneiddan, Natgaredig, Carmarthenshire.

18. So much of the Army Council Order of the 17th July, 1917, prohibiting the lifting of hay and straw in Great Britain and Ireland and the Isle of Man as relates to the lifting of hay and straw in England and Wales is hereby cancelled, but nothing in this Order shall affect the said Order of the 17th July, 1917, in so far as it relates to the lifting of hay, oat and wheat straw in Scotland, Ireland and the Isle of Man.

AN Order (No. 1,028), dated the 16th August, 1918, has been made by the Food Controller and contains the following main provisions :—

The Wild Rabbits (Prices) Order, 1918.

1. (*a*) A person shall not sell or offer or expose for sale or buy or offer to buy any wild rabbits or any part thereof at a price exceeding the maximum price for the time being applicable under this Order.

(*b*) Until further notice the maximum price for wild rabbits shall be at the rate applicable according to the Schedule and the subsequent provisions of this Order.

(*c*) The Food Controller may at any time by notice under this Order prescribe other prices for wild rabbits.

2. On the occasion of a sale (other than a sale by retail) of any wild rabbits the maximum price shall be :—

(i.) On a sale to a collector buying in the ordinary course of his business at the rate applicable according to Part 1 of the Schedule.

(ii.) On any other sale at the rate applicable according to Part 2 of the Schedule.

3. The maximum price applicable under Clause 2 (ii.) is fixed on the basis of the following terms and conditions being applicable to the transaction :—

(i.) Payment to be net cash within 7 days of completion of delivery and moneys then unpaid thereafter to carry interest not exceeding the rate of £5 per centum per annum or bank rate, whichever shall be the higher.

(ii.) Delivery to be at the seller's expense to the buyer's nearest railway station or at the option of the seller to the buyer's premises.

(iii.) All cost of packing, packages and charges incidental thereto to be borne by the seller ; except that the seller may make an additional charge for the cost of the packages in which the wild rabbits are packed ; provided that such sum shall be repaid by the seller to the buyer on return of such packages in good condition to the seller's nearest railway station.

Where the contract is made on terms and conditions other than the above, a corresponding adjustment shall be made in the maximum price. In particular where any wild rabbits are sold carriage forward, the maximum price shall be decreased by a sum equal to the cost of such carriage.

4. (*a*) On the occasion of a sale by retail of any wild rabbits or part thereof the maximum price shall be the price applicable according to Part 3 of the Schedule.

(*b*) The maximum price shall include all cost of skinning, packing and packages and no charge may be made therefore or for giving credit.

(*c*) Where any wild rabbits are delivered at the request of the buyer otherwise than at the seller's premises, an additional charge may be made in respect of such delivery not exceeding a sum at the rate of ½*d*. per lb. or any larger sum properly and actually paid by the seller for carriage.

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13. Nothing in this Order shall apply to :—

(a) A sale of live rabbits;

(b) A sale of canned wild rabbits; or

(c) A sale of cooked wild rabbits by a caterer in the ordinary course of his catering business.

14. The Rabbits (Prices) Order, 1918,* is hereby revoked as at the 2nd September, 1918, without prejudice to any proceedings in respect of any contravention thereof.

The Schedule.

Maximum prices at the rate per lb. of :—

Part 1	6*d.*
„ 2	8*d.*
„ 3	9½*d.*

NOTE.—"Wild Rabbits" means all rabbits, whether imported or not, except rabbits proved to have been bred in captivity.

THE following Notice was issued by the Food Production Department of the Board towards the end of August :—

The Feeding of Lambs and Hurdle Sheep.

The restrictions placed upon the use of the limited supplies of feeding-stuffs available, and the exclusion of all classes of sheep from the list of animals for which oil-cakes, etc. can at present be obtained, are causing much concern to those who have been in the habit of feeding lambs and hurdle sheep. It may not be generally known that the use of oats, beans and peas is not restricted. Useful mixtures for the feeding of both lambs and older sheep may be made from these, and it will be found that such mixtures form valuable and effective substitutes for the feeding-stuffs commonly used for this purpose in the past. It is much to be hoped that every effort will be made to prevent any serious reduction in the number of sheep fed during the coming winter. The difficulty anticipated by sheep-feeders in fattening their stock next winter may be largely overcome by the skilful use of those home-grown foods upon which no restrictions have been placed.

AN Order (No. 936), dated 27th July, 1918, has been issued by the Food Controller, which takes effect from 29th July, restricting dealing in and the prices for certain varieties of plums. The fruits and growers' prices are as follows :—

The Plums (Sales) Order, 1918.

Blaisdon	£40 per ton.
Bush plum or mogul	„ „
Pershore or egg plum	£30 „
Gisbourne	„ „

Dealers are allowed to add a commission of 30*s.* a ton, and provision is made as to packages and tolls on the lines laid down in the Soft Fruit Order.

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* Printed in this *Journal*, February, 1918, p. 1321.

An Order (No. 1054), dated 23rd August, 1918, has been made by the Food Controller to the effect that :—

The Damson (Sales) Order, 1918.

On and after the 28th August, 1918, the provisions of the Plums (Sales) Order, 1918* (hereinafter called the Principal Order), shall apply to damsons in the same way as such Order applies to plums of the variety "Blaisdon" and so that the schedule price for damsons shall be £40 per ton, and in the application of Clauses 1, 2, 4, 6, 8, 10, 11 and 12 the date 28th August, 1918, shall be substituted for the date 29th July, 1918.

AN Order (No. 1,021), dated the 15th August, 1918, has been made by the Food Controller to the effect that :—

The Small Apple (Temporary Prices) Order, 1918.

1. For the purposes of this Order :—

The expression "small apples" shall mean all apples (other than apples of the varieties set out in the Schedule) which have been grown in the United Kingdom and which are capable of passing through a ring 2-inches in diameter.

The expression "licensed jam manufacturer" shall mean a person holding a licence from the Food Controller authorising him to purchase soft fruit for the manufacture of jam for sale.

The expression "recognised fruit salesman" shall mean a person who in the ordinary course of his trade buys fruit in wholesale quantities for re-sale, or sells on commission.

2. A person who grows any small apples shall not sell or deliver or offer to sell or deliver the same to any other person than :—

(a) A licensed jam manufacturer; or

(b) A recognised fruit salesman who has given to the grower a dated and written undertaking signed by the salesman that he will re-sell such fruit only to a licensed jam manufacturer.

3. Where a recognised fruit salesman has bought from a grower any small apples, he shall not sell such apples except to a licensed jam manufacturer.

4. A licensed jam manufacturer shall not buy or take delivery of any small apples or use any small apples bought by or delivered to him for any purpose other than the purpose of manufacturing jam or pulp for sale.

5. Until further notice no small apples shall be sold by the grower thereof at a price exceeding £12 per ton f.o.r. ship, or barge, at the grower's station, port or wharf, together withthe additional charges permitted by this Order. Such price shall include all charges for gathering and packing.

6. The additional charges permitted on a sale by the grower are :—

(a) Where the fruit is delivered by the grower to the buyer's premises or for sale in a market, the customary charges for such delivery not exceeding in any case an amount equal to the cost of transport from the grower's station, port, or wharf to the buyer's premises or the market in which the fruit is sold.

(b) Where packages are provided by the grower a charge not exceeding the rate of 40s. per ton of fruit for the use of pecks and strikes and half-sieves, and 25s. per ton of fruit for the use of other usual

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* See p. 753.

packages (other than bags) and 10*s.* per ton for the use of bags. All pecks, strikes, half-sieves, bags or other packages to be returned to the grower carriage paid.

(*c*) All market tolls actually paid in respect of the fruit by the grower.

7. Until further notice no small apples shall be sold by any person other than the grower of the fruit sold at a price exceeding £12 12*s.* 6*d.* per ton, together with the additional charges permitted by this Order to be paid to the grower, to the extent to which the same are payable or have been paid, and together also with the following additions where applicable :—

(*a*) The amount of the transport charges, if any, paid or payable by such person in respect of the fruit and not included in the sum paid to the grower ;

(*b*) The amount of any market tolls actually paid by such person in respect of such fruit ; and

(*c*) A sum at the rates and on the terms set out in Clause 6 (*b*) hereof in respect of packages provided by such person.

8. Except in such cases as the Food Controller may otherwise determine, all contracts subsisting on the 19th August, 1918, for the sale of small apples grown or to be delivered in the United Kingdom, shall be cancelled so far as the same relate to small apples not delivered before that date.

THE SCHEDULE.

Beauty of Bath, Benoni, Ben's Red, Cox's Orange Pippin, Devonshire Quarrendon, Duchess' Favourite (syn. Duchess of Gloucester), Duchess of Oldenburgh, Feltham Beauty, Gladstone, Hunt's Early, Irish Peach, James Grieve, Juneating (red and white), King of the Pippins (syn. Princess Pippin), Lady Sudeley, Langley Pippin, Miller's Seedling, Worcester Pearmain, Yellow Ingestrie.

AN Order (No. 1,053), dated 23rd August, 1918, has been made by the Food Controller to the effect that :—

The Blackberries Order.

1. No blackberries or pulp made from blackberries shall be used for any purpose other than as an article of food or in the manufacture of an article of food.

2. A person who, for the purpose of sale, manufactures jam, or bottles, or otherwise in any form preserves blackberries (hereinafter called a jam manufacturer), shall not by himself or his agent buy or agree to buy for the purposes of such manufacture or preserving any blackberries at a price exceeding £42 per ton, or pay to the seller or his agent in respect of such fruit any charges other than those permitted under this Order. The maximum price under this Clause includes all charges for picking and packing.

3. The additional charges permitted on a purchase to which Clasue 2 applies are :—

(*a*) Where fruit is delivered to the buyer's premises or for sale in a market the customary charges for such delivery, not exceeding in any case an amount equal to the cost of transport to the buyer's premises or the market in which the fruit is sold from a railway station, port or wharf, near the place where the fruit was grown ;

(*b*) Where packages are provided by some person other than the jam manufacturer,

(i.) A charge not exceeding the rate of 40*s.* per ton of fruit for the use of pecks, strikes and half-sieves, and 25*s.* per ton of fruit

for the use of baskets or other usual packages (other than chip baskets and punnets). All pecks, strikes, half-sieves, baskets, or other packages to be returned carriage paid.

(ii.) A charge not exceeding 40*s.* per ton of fruit delivered in chip baskets or punnets, the chip baskets and punnets to be non-returnable.

4. (*a*) A person shall not sell by retail or offer or expose for retail sale or buy or offer to buy by retail any blackberries at a price exceeding 4*d.* per lb.

(*b*) No addition shall be made to the price fixed by this Clause in respect of picking, packages, giving credit or making delivery.

5. Where any blackberries to which this Order applies are bought by or on behalf of a jam manufacturer, such blackberries shall until the contrary be proved be deemed to be bought for the purposes of manufacturing jam or preserving blackberries for the purpose of sale.

6. A person shall not sell or buy, or offer to sell or buy, any blackberries at a price or make any payment in excess of the prices permitted by this Order, or in connection with the sale or disposal of any such fruit enter or offer to enter into any fictitious or artificial transaction.

THE Ministry of Food have made the following arrangements for the opening of the Game Season :—

The Supply of Game for Food.

Applications for permission to purchase shot-gun cartridges are to be made on Form S.C. 2, obtainable at the gun-makers. On £1 game licences, 300 cartridges are obtainable ; on £2 or £3 game licences, 500 cartridges are obtainable.

Applications for soft-nosed rifle cartridges should be made on D.R. Form 23 B., which is obtainable at the gun-makers, and must be sent by applicants personally, and forwarded for approval and registration in the case of cartridges required for use in England and Wales to the Secretary, Venison Committee, 100, Cromwell Road, London, S.W. 7, and in the case of cartridges required for use in Scotland to the Secretary, Board of Agriculture for Scotland, 29, St. Andrew's Square, Edinburgh.

Table of Coupon Rates for Game and Venison.—The following are the rations which have been fixed for self-suppliers, direct supplies, and customary gifts :—

Description of Animal.	Value of Meat when Consumed by Self-suppliers.	Value of Meat for Direct Supplies.
Rabbits and Hares.	Ration free.	Skinned rabbit up to 1¾ lb., 1 coupon. Unskinned rabbit up to 2 lb., 1 coupon; all other rabbits, 2 coupons. Parts of rabbits, 1 coupon per 1¼ lb. Rabbits received as free gifts. Ration free. Blue hares or leverets, 2 coupons. Brown leverets, 3 coupons. Brown hares, 4 coupons.

Type of Game.	Value of Meat for Self-suppliers.	Value of Meat for Direct Supplies.
Venison	1 coupon per 2 lb. meat. Offal ration free.	1 coupon per 1 lb. of meat. Offal ration free.
Pheasants, wild duck, guinea fowl and capercailzie ..	1 coupon for every 2 birds.	1 coupon per bird.
Grouse, partridges, black game, widgeon	1 coupon for every 4 birds.	1 coupon for every 2 birds.
Teal, Ptarmigan, woodcock ..	1 coupon for every 8 birds.	1 coupon for every 4 birds.
Plover	1 coupon for every 12 birds.	1 coupon for every 6 birds.
Quail and Snipe ..	1 coupon for every 16 birds.	1 coupon for every 8 birds.

Customary Gifts.—On the basis of direct suppliers in all instances, and the recipients will be responsible for detaching their coupons.

Price of Grouse and Black Game.—The following prices have been fixed for grouse and black game :—

Young birds hatched in the year 1918, and sold prior to 1st November, 1918, not exceeding for any one bird, 4*s*. 3*d*. to the retailer, 5*s*. 6*d*. to the consumer.

All other grouse and black game, not exceeding for any one bird, 2*s*. 6*d*. to the retailer, 3*s*. 3*d*. to the consumer.

Carriage of Game to Market.—The Ministry of Food are advised that the owner of a deer forest for shooting who disposes of his game or venison for public consumption is entitled to be regarded as carrying on a trade or business within the meaning of paragraph 3 A (2) of the Motor Spirit (Consolidation) and Gas Restriction Order, 1918, and that a privately owned car can therefore be used for the carriage of game or venison to market if the journey cannot otherwise be reasonably and conveniently accomplished. A privately owned car cannot, however, be used in the same way as a trade vehicle, as the latter may be used for any trade purpose whether or not the journey can be otherwise reasonably and conveniently accomplished. The Petrol Controller will be prepared to consider any application approved by the Ministry of Food for an increased allotment of petrol for the purpose of transporting dead game to the nearest available market or centre of distribution where other transport facilities are not available. Such applications should be made through the Divisional Food Commissioners for the area concerned.

Position of Persons taking Shootings.—The question has been raised in several quarters as to the positions of persons who propose to take shootings. In dealing with enquiries, Committees should make clear the point that *the person taking the shooting will be responsible for detaching coupons only in respect of game consumed in his household.* As regards game sent by him to friends, the head of the household in which the game is consumed will be responsible for detaching and keeping the coupons at the direct suppliers' rate. If the game is given to employees living outside the household, entitled to rank as self-suppliers, consumption is accounted for at self-suppliers' rates, and it is the employee who is responsible for detaching the coupons.

The date of the shooting season for grouse and black game commences on 6th August, 1918.

Self-Suppliers' and Direct Supplies.—The following important alterations should be noted in the existing regulations as to consumption of home-produced rationed foods :—

Self-Suppliers' Poultry.—Owners of 50 head or less of poultry will not be required to keep records of consumption. Persons owning fowls will be entitled to consume free of the ration one bird per week for every four people or less in the household.

Use of Coupons.—In accounting for the home consumption of rationed foodstuffs, the self-suppliers are not confined to the coupons numbered to correspond with the week in which the food has to be accounted for, but may use either previous or subsequent coupons in addition to the current ones. The head of the household will be responsible for detaching the correct number of coupons corresponding to the amount of meat consumed and for preserving them for production to the Food Control Committee when required.

Direct Supplies.—Direct supply permits and certificates to the producer to the effect that the consumer will refrain from purchasing rationed foodstuffs to the extent of his direct supplies are no longer required.

Table of Coupon Rates for Domestic Birds.

Description of Animal.	When Consumed by Self-suppliers.	When Consumed as Direct Supplies.
Fowls and Chickens	Consumption ration free : up to limit of one bird for a household of 4 persons (or less) per week ; 2 birds a week for a household of more than 4 and not more than 8 persons, etc. For consumption in excess of this rate, 1 coupon per bird.	1 coupon per bird up to 3 lb. 2 coupons per bird up to 5 lb. 3 coupons over 5 lb.
Domestic Ducks and Geese.	Ducks—*1 coupon per bird* Geese—3 coupons per bird	*1 coupon per bird up to 4 lb.* 2 coupons per bird up to 6 lb. 1 additional coupon for every 2 lb. up to 16 lb. 8 coupons per bird over 16 lb.
Turkeys ..	3 coupons per bird ..	3 coupons per bird up to 6 lb. 1 additional coupon for every 2 lb. up to 14 lb. 8 coupons per bird over 14 lb.
Domestic Pigeons	1 coupon for each 9 birds	1 coupon for each 6 birds.

The weights of poultry are to be taken without feathers, but with all offal.

Butter consumed by a self-supplier can be consumed at the rate of 8 oz. per head per week in place of 5 oz. (the usual rate).

Wood pigeons, rooks and other birds not included in the above tables and goats are ration free.

Sale of Poultry in Faulty Condition.

IT has been officially decided that the concession made on 5th July 1918, by which, in order to facilitate the sale of poultry arriving in public markets in a faulty condition, retailer were empowered (subject to limitations as t price) to sell such poultry free of the coupor shall be extended to all poultry which is sol by the retailer at a price not exceeding 1*s.* 4*d.* per lb. This furthe concession came into force on 12th August, and will continue unt further notice.

The Butter Order, 1918.

AN Order (No. 976), dated 31st July, 1918, has been made by th Food Controller to the effect that :—

1. A person shall not sell or offer or expos for sale or buy or offer to buy any butte at prices exceeding the maximum price applicable under this Order.

2. The maximum prices shall be such prices as the Food Controll may from time to time prescribe by notice under this Order and unt further notice shall be the prices hereinafter provided.

3. (*a*) On the occasion of a sale (other than a sale by retail) British-made butter by or on behalf of the maker or the blender thereo the maximum price shall be as follows :—

(i.) If the butter be sold in rolls, bricks, prints or pats of 1 lb. weight less, at the rate of 2*s.* 1½*d.* per lb. ;

(ii.) In any other case, at the rate of 2*s.* 1*d.* per lb.

Provided that, where the buyer declares in writing that he is buyir such butter for re-sale to a retail dealer, the prices applicable und this Sub-clause shall be reduced by a sum at the rate of 1½*d.* per lb.

(*b*) The prices fixed by this Clause are prices ex creamery, factor farm or blender's premises and include all charges for packages, packir and credit.

4. (*a*) On the occasion of a sale of British-made butter (not beir a sale by retail or a sale to which Clause 3 applies) or on the occasic of a sale of Government butter (not being a sale by retail) the maximu price shall be as follows :—

(i.) If the butter be sold in rolls, bricks, prints or pats of 1 lb. or less, the rate of 2*s.* 1½*d.* per lb.

(ii.) In any other case, at the rate of 2*s.* 1*d.* per lb.

(*b*) The maximum prices fixed by this Clause are fixed on the bas that the cost of packing and packages and the cost of delivery to tl buyer's premises is included in the price.

5. (*a*) On the occasion of a sale to which Clause 4 applies, the tern of sale shall be at the seller's option either ;

(i.) Payment before delivery, with discount at the rate of 5 per cent. p annum, for two months ;

(ii.) Payment within 7 days of date of invoice, with discount at the ra of 5 per cent. per annum for two months ;

(iii.) Payment after 7 days of date of invoice, with discount at the rate 5 per cent. per annum for the unexpired portion of two montl and 3 days from the date of invoice.

(*b*) For the purposes of this Clause "date of invoice" shall me the date of despatch of the goods to the buyer, or the date borne the invoice, whichever shall be the later, excepting in cases where butt is detained pending buyer's instructions, in which case it shall mean t date when the goods were ready for despatch to the buyer.

6. (*a*) On the occasion of a sale by retail of any butter, the maximum price shall be at the rate of 2*s*. 4*d*. per lb. except that in calculating the maximum price chargeable on any sale any broken halfpenny included in the maximum price shall count as a halfpenny.

(*b*) No charge may be made for packing, packages or giving credit, but if the butter is delivered at the buyer's request, otherwise than at the seller's premises, an additional charge may be made for such delivery not exceeding a sum at the rate of ½*d*. per lb. or any larger sum actually and properly paid by the seller for carriage.

7. A Food Committee may from time to time by resolution vary the maximum price for butter sold by retail within their area or any part of such area; but

(*a*) Every such resolution shall be reported to the Food Controller within 5 days and shall not take effect until three days after the same has been sanctioned by the Food Controller; and

(*b*) Every such resolution of a Food Committee under this Clause shall be subject at any time to review by the Food Controller and shall be withdrawn or varied as he may direct.

8. On the occasion of a sale of any butter, the seller shall deliver to the buyer an invoice stating accurately the description of the butter as Government or British-made butter, as the case may be, the price charged and the quantity sold, and the invoice shall also state whether the butter sold in prints, pats, bricks, or rolls of 1 lb. or less or otherwise. Provided that no such invoice need be given upon the occasion of a retail sale unless the buyer demands the same.

9. A person shall not in connection with any sale or disposition or proposed sale or disposition of butter, enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

10. Nothing in this Order shall apply to the sale of any butter by a caterer in the ordinary course of his business as part of a meal.

11. Infringements of this Order are summary offences against the Defence of the Realm Regulations.

12. For the purposes of this Order "Government Butter" means—

(*a*) All butter (whether made in the United Kingdom or imported) which is from time to time distributed for sale in Great Britain by the Food Controller under the Butter (Distribution) Order, 1917, or under any directions or regulations given or made or to be given thereunder; and

(*b*) All butter made, blended or collected by any blender holding a licence as such issued by or under the authority of the Food Controller. "British made butter" means all butter other than Government Butter.

13. The Butter (Maximum Prices) Order, 1917,* as amended by the Butter (Maximum Prices) Amendment Order, 1917,† and the Directions, dated 22nd June, 1918, under the Butter (Distribution) Order, 1917, are hereby revoked as from the 7th August, 1918, but without prejudice to any proceedings in respect of any contravention thereof.

NOTE.—This Order came into force on 7th August, 1918, and does not apply to Ireland.

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* Order No. 913, 1918, printed in this *Journal*, September, 1917, p. 678.
† Order No. 1,110, 1918, printed in this *Journal*, November, 1917, p. 906.

Reasons for Control of Cheese.

MR. J. R. CLYNES, M.P., the Food Controller, referring to a published statement with regard to the rationing of cheese, explains that the reason which has guided the Ministry in deciding not to enforce an individual ration is, in effect, that equality in the distribution is not desired. Broadly, the scheme for distribution which has now been settled and which is to be brought almost immediately into operation provides :—

(1) That the larger proportion of cheese would go into mining and certain other areas where it is a staple article of food.

(2) That special facilities should be arranged whereby agricultural labourers should receive supplies of cheese from their employers at first-hand prices.

(3) That the Local Food Committees should obtain returns of the quantities of cheese going into their area, and if it is found there has been any appreciable increase in the population of that area these supplies should be proportionately increased.

The Ministry are hoping that the scheme framed on the above lines will meet the situation. Any scheme of rationing would involve supplying cheese to people who did not want it at the expense of those to whom it was almost a necessity.

The Rats Order, 1918.

AN Order (No. 4,071), dated 28th August, 1918, has been made by the Food Controller to the effect that :—

1. Where a local authority are of opinion that rats are causing preventable damage or destruction to foodstuffs within their district they may take such measures as they shall think proper for the destruction of such rats.

2. (*a*) Where a local authority are of opinion that the owner or occupier of any lands or buildings has neglected to take reasonable and proper precautions to prevent such lands or buildings becoming infested by rats, or has neglected to remove from such land or buildings any rubbish or other materials likely to attract rats, they may give to such owner or occupier directions requiring him to take such steps as in the opinion of the local authority are reasonable and proper for the purpose of preventing such lands or buildings being infested by rats or requiring him to remove or destroy such rubbish or other materials.

(*b*) It shall be the duty of such owner or occupier to comply with all such directions, and where in the opinion of a local authority the owner or occupier of any land or building has failed to comply with any such directions within 7 days of the same being given or such later period as may be specified by the local authority, they may enter on such land or buildings, and take such measures as are enjoined by such directions and may recover from such owner or occupier any expenses incurred by them so far as such expenses are directly attributable to the failure of such owner or occupier to carry out his obligations under those directions.

3. A local authority in the exercise of the powers conferred by this Order shall have regard to any recommendations which may be made to them in England and Wales by the Board of Agriculture and Fisheries or a War Agricultural Executive Committee in the area of the

local authority and in Scotland by the Board of Agriculture for Scotland or a District Agricultural Executive Committee acting in the area of the local authority.

4. A local authority in England or Wales and any person authorised by them are hereby authorised to prosecute any offence against the Defence of the Realm Regulations occasioned by a breach of this Order.

5. Failure to comply with this Order or any direction given thereunder is a summary offence against the Defence of the Realm Regulations.

6. For the purposes of this Order, the expression "foodstuffs" shall include growing crops, but this shall not be construed so as to limit the general interpretation of that expression.

The expression "local authority" shall mean, as regards England and Wales, a county council or the council of a county borough; and, as regards Scotland, a county council or a town council.

7. (*a*) This Order may be cited as the Rats Order, 1918.

(*b*) This Order shall not apply to Ireland.

THE following Notice was issued by the Food Production Department of the Board on 30th August:—

Caterpillar Plagues and their Prevention.

If all fruit growers would combine in a great preventive campaign against fruit tree pests we should be insured against a repetition of this year's plague of caterpillars, which caused such havoc in our gardens and orchards. It cannot be too often stated that the greater part of the ills that afflict our garden, market garden, and orchard crops can be obviated by preventive measures taken in due season. If we wish to be saved from a plague of caterpillars next spring and summer we must grease-band our standard and half-standard fruit trees now and take other precautions during the winter and spring.

As soon as possible, and at latest not later than the end of September, the grease-bands should be applied, for early in October the wingless females of the winter moth family begin to crawl up the trunks of the trees and to lay their eggs on spurs and twigs. In the spring these eggs will hatch into small caterpillars, and these caterpillars will soon strip the trees of their leaves, to the great detriment of the immediate fruit crop and the eventual health of the tree. The best method of preventing these lamentable results is to tie bands of stout grease-proof paper smeared with a sticky preparation sold for the purpose round the trunks of the trees. The moths attempting to climb the trunks become entangled in the "grease bands" and die. The grease should be smeared every four or five weeks when the outside surface has become dry from exposure.

For further information on this subject apply to the Food Production Department, 72, Victoria Street, S.W. 1, or write to the Board of Agriculture, 3, St. James's Square, S.W. 1, for copies of F.P. Leaflet No. 12 (*Grease Banding of Fruit Trees*), and Leaflet No. 4 (*Winter Moths*).

Readers will be well advised to purchase the necessary materials at once.

Agricultural Returns, 1918: Preliminary Statement.

ACCORDING to a Preliminary Statement issued by the Board of Agriculture and Fisheries on 27th August, the returns of acreage and live stock collected on the 4th June last show that the total arable area in England and Wales this year is 12,398,730 acres, representing an increase of 1,152,620 acres or 10 per cent. over the arable area of 1917. This is the largest area returned for the past twenty years. The area under permanent grass is 14,588,900 acres, a decrease of 1,246,470 acres on the year. The total area under crops and grass thus amounts to 26,987,630 acres, as compared with 27,081,480 acres in 1917.

The greater part of the grass-land ploughed up has been placed under wheat and oats. The increase in the area under Wheat is 638,260 acres, or 33 per cent., and the total now under this crop amounts to 2,556,740 acres, which is the largest since 1884. Oats this year cover 2,778,980 acres, the largest on record, and 520,070 acres (23 per cent.) more than last year. The other corn and pulse crops also show increases; Barley by 42,000 acres, Rye by 45,000 acres, Beans by 40,000 acres, and Peas by 19,000 acres. To these cereal areas there have to be added 141,580 acres under Mixed Corn now for the first time separately distinguished, the returns of such crops having previously been divided between the various corn crops, according to the kinds grown.

The total area under Corn and Pulse (wheat, barley, oats, rye, beans, peas and mixed corn) this year thus amounts to 7,481,000, acres as compared with 6,035,000 acres in 1917; an increase of 1,446,000 acres or 24 per cent., and the largest area under corn since 1879.

Potatoes have been increased by 125,850 acres, or 25 per cent., and the total area (633,840 acres) is much the largest on record. Most other crops naturally show a decline, especially Turnips and Swedes, which are reduced by 6 per cent., and are the lowest on record; but the Mangold area is slightly greater, and Flax this year covers 18,400 acres—more than 7 times the area of last year, and the largest but two (in 1869 and 1870) for the past 50 years.

The area under Clovers, Sainfoin, and Rotation Grasses has been reduced by 400,000 acres (16 per cent.), and the total (2,095,000 acres) is the smallest on record. Of this 1,446,500 acres were reserved for hay; this also being the smallest ever returned, and representing a decline of 235,000 acres on the year. Of the permanent grass 4,300,000 acres (nearly half a million less than last year) were reserved for hay. The total Hay area thus amounts to not quite 5,750,000 acres, or 730,000 less than in 1917, and the smallest since 1885.

Horses on agricultural holdings are practically unchanged, being just 3,000 more than last year. There is an increase of over 3 per cent. in the number used for agricultural purposes, but a decline in the younger unbroken classes. The total of Cows and heifers, in milk or in calf, is 2,578,000, is 113,000 more than last year, and the largest on record, being nearly 100,000 more than the previous highest (1914). The increase occurs in all categories of the dairy herd, but chiefly among the cows in calf but not in milk. Beef cattle, however, show a decline, particularly the older groups, and the total of all Cattle 6,200,000, is some 27,000 less than the record total of last year. Sheep show a considerable reduction, in spite of a small increase in lambs; the total, 16,475,000, is 4 per cent. less than last year, and (like the ewes) repre-

sents the smallest number ever kept, so far as the records show, while the number of lambs is the lowest since 1883. Pigs show a decline of 220,000 (over 11 per cent.); and the total of 1,697,000 is the lowest on record. *The decline is, however, entirely among "other pigs" as* breeding sows show a material increase of 35,000 or 14 per cent.

PRELIMINARY STATEMENT for 1918, compiled from the Returns collected on the 4th June; and comparison with 1917.

CROPS.

DISTRIBUTION.	1918.	1917.	INCREASE.		DECREASE.	
	Acres	*Acres.*	*Acres.*	*Per Cent.*	*Acres.*	*Per Cent.*
TOTAL ACREAGE under all CROPS and GRASS (a)	**26,987,630**	27,081,480	—	—	93,850	0·3
ARABLE LAND	**12,392,730**	11,240,110	1,152,620	10·2	—	—
PERMANENT GRASS (a) — For Hay ...	**4,298,680**	4,794,210	—	—	495,530	10·3
PERMANENT GRASS (a) — Not for Hay	**10,290,220**	11,041,160	—	—	750,940	6·8
PERMANENT GRASS (a) — TOTAL ...	**14,588,900**	15,835,370	—	—	1,246,470	7·9
Wheat — Autumn Sown	**2,293,500**	1,724,700	568,800	33·0	—	—
Wheat — Spring Sown	**263,240**	193,780	69,460	35·8	—	—
Wheat — TOTAL	**2,556,740**	1,918,480	638,260	33·3	—	—
Barley	**1,501,830**	1,459,800	42,030	2·9	—	—
Oats	**2,778,980**	2,258,910	520,070	23·0	—	—
Mixed Corn (b)	**141,580**	(b)	—	—	—	—
Rye	**101,450**	56,010	45,440	81·1	—	—
Beans	**250,690**	210,590	40,100	19·9	—	—
Peas	**150,100**	131,000	19,100	14·6	—	—
Buckwheat	**7,260**	4,700	2,560	54·5	—	—
Potatoes	**633,840**	507,990	125,850	24·8	—	—
Turnips and Swedes	**910,710**	972,370	—	—	61,660	6·3
Mangold	**401,290**	388,840	12,450	3·2	—	—
Cabbage	**38,830**	39,070	—	—	240	0·6
Kohl-Rabi	**13,050**	14,560	—	—	1,510	10·4
Rape	**60,100**	64,170	—	—	4,070	6·3
Vetches or Tares	**62,000**	78,760	—	—	16,760	21·3
Lucerne	**40,070**	50,210	—	—	10,140	20·2
Mustard	**24,950**	24,790	160	0·6	—	—
Brussels Sprouts	**10,690**	11,630	—	—	940	8·1
Cauliflower or Broccoli	**9,240**	9,170	70	0·8	—	—
Carrots	**11,850**	15,520	—	—	3,670	23·6
Onions	**8,070**	6,470	1,600	24·7	—	—
Celery	**3,000**	3,150	—	—	150	4·8
Rhubarb	**5,750**	6,470	—	—	720	11·1
Chicory	**1,040**	550	490	89·1	—	—
Flax	**18,400**	2,510	15,890	633·1	—	—
Hops	**15,670**	16,950	—	—	1,280	7·6
Small Fruit	**65,680**	71,940	—	—	6,260	8·7
CLOVER and ROTATION GRASSES — For Hay ...	**1,446,500**	1,681,900	—	—	235,400	14·0
CLOVER and ROTATION GRASSES — Not for Hay	**648,820**	817,640	—	—	168,820	20·6
CLOVER and ROTATION GRASSES — TOTAL ...	**2,095,320**	2,499,540	—	—	404,220	16·2
OTHER CROPS	**71,840**	60,660	5,180	7·8	—	—
BARE FALLOW	**408,710**	355,300	53,410	15·0	—	—
ORCHARDS (c)	**263,060**	259,450	3,610	1·4	—	—

(a) Excluding Mountain and Heath Land used for grazing (3,988,450 acres in 1918, as compared with 3,901,710 acres in 1917).

(b) The areas of Mixed Corn were apportioned in previous years among Wheat, Barley and Oats.

(c) Any Crop or Grass grown in Orchards is also returned under its proper heading.

LIVE STOCK.

KIND.	1918.	1917.	INCREASE.		DECREASE.	
	No.	*No.*	*No.*	*Per Cent.*	*No.*	*Per Cent.*
Horses used for Agricultural purposes (*including Mares for Breeding*)	**822,430**	796,040	26,390	3 3	—	—
Unbroken Horses (including Stallions). One year and above ...	**227,560**	237,400	—	—	9,840	4·1
Unbroken Horses (including Stallions). Under one year	**100,070**	104,360	—	—	4,290	4·1
Other Horses	**225,770**	235,020	—	—	9,250	3·9
TOTAL OF HORSES	**1,375,830**	1,372,820	3,010	0·2	—	—
Cows and Heifers in Milk ...	**1,858,200**	1,831,440	26,760	1·5	—	—
Cows in Calf but not in Milk ...	**335,090**	271,540	63,550	23·4	—	—
Heifers in Calf	**384,680**	361,820	22,860	6·3	—	—
Other Cattle:—Two years and above	**1,000,770**	1,093,770		—	93,000	8·5
" " One year & under two	**1,338,510**	1,353,320	—	—	14,810	1·1
" " Under one year ..	**1,283,240**	1,315,260	—	—	32,020	2·4
TOTAL OF CATTLE	**6,200,490**	6,227,150	—	—	26,660	0·4
Ewes kept for Breeding	**6,486,780**	6,872,030	—	—	385,250	5·6
Other Sheep:—One year & above	**3,160,720**	3,563,520	—	—	402,800	11·3
" " Under one year ...	**6,827,680**	6,734,310	93,370	1·4	—	—
TOTAL OF SHEEP	**16,475,180**	17,169,860	—	—	694,680	4·0
Sows kept for Breeding	**289,540**	254,290	35,250	13 9	—	—
Other Pigs	**1,407,530**	1,664,250	—		256,720	15·4
TOTAL OF PIGS	**1,697,070**	1,918,540	—	—	221,470	11·5

Acreage of Hops in England and Wales, 1918.

THE following is a PRELIMINARY STATEMENT compiled from the returns collected on the 4th June, 1918, showing the acreage under Hops in each County of England in which Hops were grown, with a Comparative Statement for the years 1917 and 1916. It is dated 26th August, 1918:—

COUNTIES, ETC.	1918.	1917.	1916.
	Acres.	*Acres.*	*Acres.*
KENT East	**2,371**	2,351	5,326
KENT Mid.	**3,336**	3,667	6,467
KENT Weald	**4,032**	4,447	7,706
Total, Kent ..	**9,739**	10,465	19,499
HANTS	**717**	790	1,380
HEREFORD	**2,331**	2,629	4,645
SURREY	**193**	189	426
SUSSEX	**1,310**	1,478	2,656
WORCESTER	**1,328**	1,342	2,643
OTHER COUNTIES ..	**48**	53	103
Total	**15,666**	16,946	31,352

Minimum Rates of Wages, etc., Fixed by the Agricultural Wages Board.

SINCE the date of the list given on p. 601 of the *Journal* for last month the following minimum rates of Wages for adult agricultural male workers have been fixed by the Agricultural Wages Board; hours of work represented in Summer and Winter respectively by such minimum wage; and overtime rates per hour, and age of worker at which such rates apply.

1. ORDINARY LABOURERS.

Date on which Rate came into Force.	District.	Minimum Weekly Wage.		Hours in Summer (S.) and Winter (W.) represented by Wage.		Overtime Rate per Hour.*	Age at which Wage comes into Operation.
1918.		s.	d.	S.	W.	d. d.	Years Old.
Aug. 19 ..	Wiltshire ..	30	0	54	48	8½ and 10	18
,, 19 ..	Cheshire ..	36	0	60		9 ,, 10	18
Sept. 2 ..	Sussex ..	32	0	54	48	9 ,, 11	21
		30	0	54	48	8½ ,, 10	18 to 21
,, 2 ..	Surrey ..	33	0	54	48	9 ,, 11	21
		31	0	54	48	8½ ,, 10	18 to 21
		26	0	54	48	7 ,, 8½	17 ,, 18
		22	0	54	48	6 ,, 7½	16 ,, 17
,, 2 ..	Surrey ..	18	0	54	48	5 ,, 6	15 to 16
		14	0	54	48	4 ,, 4½	14 ,, 15
		10	0	54	48	3 ,, 3½	Under 14
,, 2 ..	Staffordshire	35	0	57		9 ,, 11	21
		34	0	57		9 ,, 10½	20 to 21
		32	0	57		8½ ,, 10	18 ,, 20
		26	0	57		7 ,, 8	17 ,, 18
		22	0	57		6 ,, 7	16 ,, 17
		18	0	57		4½ ,, 5½	15 ,, 16
		14	0	57		3½ ,, 4½	14 ,, 15
		10	0	57		2½ ,, 3	Under 14
,, 2 ..	Hampshire ..	31	0	54	48	8½ ,, 10	18
,, 2 ..	Cornwall ..	31	0	54	48	9 ,, 10	18
		28	0	54	48	7 ,, 8½	17 to 18
		22	0	54	48	6 ,, 7½	16 ,, 17
		18	0	54	48	5 ,, 6	15 ,, 16
		14	0	54	48	4 ,, 4½	14 ,, 15
		10	0	54	48	3 ,, 3½	Under 14
,, 2 ..	Shropshire ..	33	0	57	54	9 ,, 10	21
		31	0	57	54	9	18 to 21
		26	0	57	54	7 and 8	17 ,, 18
		22	0	57	54	6 ,, 7	16 ,, 17
		18	0	57	54	4½ ,, 5½	15 ,, 16
		14	0	57	54	3½ ,, 4½	14 ,, 16
		10	0	57	54	2½ ,, 3½	Under 14
,, 2 ..	Yorkshire ..	35	0	54	51	9½ ,, 11½	18
		30	0	54	51	8½ ,, 10	17 to 18
		25	0	54	51	7 ,, 8½	16 ,, 17
		20	0	54	51	5½ ,, 6½	15 ,, 16
		15	0	54	51	4 ,, 5	14 ,, 15
		10	0	54	51	3 ,, 3½	Under 14
,, 2 ..	Nottingham ..	35	0	60	54	9 ,, 10	18
		30	0	60	54	7½ ,, 9	17 to 18
		25	0	60	54	6½ ,, 7½	16 ,, 17

* The overtime rates are for weekdays and Sundays respectively.

Date on which Rate came into Force.	District.	Minimum Weekly Wage.		Hours in Summer (S.) and Winter (W.) represented by Wage.		Overtime Rate per Hour.*		Age at which Wage comes into Operation.
1918.		s.	d.	S.	W.	d.	d.	Years Old.
Sept. 2 ..	Nottingham ..	20	0	60	54	5 and	6	15 ,, 16
		15	0	60	54	4 ,,	4½	14 ,, 15
		10	0	60	54	2½ ,,	3	Under 14
,, 2 ..	Lincolnshire	34	0	54	48	9½ ,,	11½	21
		30	0	54	48	8½ ,,	10	18 to 21
		26	0	54	48	7 ,,	8½	17 ,, 18
		22	0	54	48	6 ,,	7½	16 ,, 17
		18	0	54	48	5 ,,	6	15 ,, 16
		14	0	54	48	4 ,,	4½	14 ,, 15
		10	0	54	48	3 ,,	3½	Under 14
,, 9 ..	Middlesex ..	34	0	54	48	9 ,,	11	21
		31	0	54	48	8½ ,,	10	18 to 21
		26	0	54	48	7 ,,	8½	17 ,, 18
		22	0	54	48	6 ,,	7½	16 to 17
		18	0	54	48	5 ,,	6	15 ,, 16
		14	0	54	48	4 ,,	4½	14 ,, 15
		10	0	54	48	3 ,,	3½	Under 14
,, 9 ..	Hertfordshire	32	0	54	48	9 ,,	11	21
		31	0	54	48	8½ ,,	10	18 to 21
		26	0	54	48	7 ,,	8½	17 ,, 18
		22	0	54	48	6 ,,	7½	16 ,, 17
		18	0	54	48	5 ,,	6	15 ,, 16
		14	0	54	48	4 ,,	4½	14 ,, 15
		10	0	54	48	3 ,,	3½	Under 14
	II. SPECIAL CLASSES.							
Sept. 2 ..	Derbyshire .. (Stockmen, Horsemen, and Shepherds).	36	0	Customary and not exceeding 63	65	9 For hours in excess of 63 in summer and 65 in winter		18
,, 2 ..	Hampshire .. (Carters, Dairymen Carters, & Shepherds).	37	0	Customary		8½ and 10		18

* The overtime rates are for weekdays and Sundays respectively.

The "Wages Board Gazette."

THE Agricultural Wages Board have commenced, as from the 15th August, 1918, the issue of a bi-monthly publication entitled the *Wages Board Gazette*, to appear on the 1st and 15th of each month. The object of this publication is to enable farmers, agricultural workers and others interested to keep informed of the Orders and Proceedings of the Agricultural Wages Board. The Gazette will contain particulars of the work of the Board and of the District Wages Committees, summaries of the current statutory notices of proposals to fix minimum rates of wages and also of the rates actually in force in different parts of the country, as well as explanations of the meaning and effect of the Board's Orders and Proposals, and other general information in connection with the Board's work.

The Gazette may be obtained at the office of the Agricultural Wages Board at the price of 1*d*. per copy (or 1½*d*. post free). Subscription rates will be 9*d*. per quarter and 3*s*. per annum (post free).

Miscellaneous Publications of the Board.

THE Board have recently added the following to their series of miscellaneous publications. Copies of these publications may be obtained on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1, at the prices stated (which include postage) :—

No. 20.—*Poverty Bottom: An Experiment in Increased Food Production* (16 pages).—This is a reprint (illustrated) of an article which appeared in this *Journal* for February last, and is an account of an experiment over seven years made by Professor Somerville with a view to increasing the productivity of poor Sussex down land by the application of scientific principles and by business management. Price *2d.*

No. 21.—*Report on the Occurrence of Insect and Fungus Pests on Plants in England and Wales in the Year* 1917 (32 pages).—This is a summary of information as to the prevalence of insect and fungus pests in England and Wales during 1917, and is intended for the use of experts and those who are studying the subject. Price *2d.*

No. 22.—*Rats: How to Exterminate Them: and the Taking of Wild Rabbits* (48 pages).—This is a reprint (well illustrated) of four articles by Mr. R. Sharpe which have appeared in recent issues of this *Journal.* Price *6d.*

Women's Work on the Land: A Correction.

THE Board desire to correct an error which appeared under the heading "Women's Work on the Land," on page 332 of the *Journal* for June last. The words "East Sussex" mentioned therein should read "West Sussex."

Prosecutions of Farmers, etc., under Statutory Rules and Orders.

Dingwall.—For failing to take reasonable precautions against rats, mice, rooks and jackdaws, whereby twelve stacks of oats and barley were partially rendered unfit for human food, a Black Isle farmer was fined £20.

Penryn.—John Brooks, of Penwerris Farm, near Falmouth, £20, for feeding wheaten flour to pigs. (*National Food Journal*, 14th August, 1918.)

Shap.—Robert Waiting, farmer, Melkinthorpe, who did not appear, and who had said to a police officer, "I am going to fill in no more forms; I put the thing on the fire," was fined £20 and costs, with the option of two months' imprisonment, for neglecting to make a return of live stock. (*National Food Journal*, 24th July, 1918.)

Barrow.—Seventeen farmers, on sales of milk to dealers, £12 to £16; a total of £218.

Chichester.—For feeding carriage horses with a mixture that contained oats Mr. A. H. Tennant, Adsdean House, was fined £20.

Doncaster.—For failing to register a flour mill and for grinding wheat unregistered, Willis Helliwell, farmer, Harlington, was fined 18 guineas, including costs.

Glasgow.—Robert Kerr, Spital Farm, Rutherglen, on wholesale sales of milk at 1s. 8d. per gal., £20.

Newmarket.—A fine of £75 was inflicted on Frank Halls, farmer, Cheveley, for selling adulterated milk. Analysis of three samples showed respectively, 11, 36 and 47 per cent. of added water. (*National Food Journal*, 28th August, 1918.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for August, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat*—The production in Canada, United States, British India, and Tunis is estimated at 190,571, 000 qr. in 1918, against 158,803,000 qr. in 1917, or an increase of 20·0 per cent. *Rye*—The estimated production in Canada and the United States is placed at 9,363,000 qr. this year, or an increase of 25·4 per cent compared with last year, when it amounted to 7,465,000 qr. *Barley*—The production in Canada, United States, and Tunis is estimated to amount to 39,247,000 qr. in 1918, against 32,666,000 qr. in 1917, or an increase of 20·1 per cent. *Oats*—It is estimated that the total yield in Canada, United States, and Tunis will amount to 194,115,000 qr. in 1918, against 207,068,000 qr. in 1917, or a decrease of 6·3 per cent. *Maize*—The production in the United States is estimated at 348,616,000 qr. this year, against 368,501,000 qr. last year, or a decrease of 5·4 per cent.

Canada.—The High Commissioner for Canada has received a report issued by the Dominion Bureau of Statistics, based upon returns made at the end of July, estimating the total yield of wheat for 1918 at nearly 232,000,000 bush. as compared with 233,742,850 bush. in 1917, and the yield of oats at about 416,000,000 bush. as against 403,000,000 bush. last year. (*Broomhall's Corn Trade News*, 24th August, 1918.)

United States.—According to the report issued by the Bureau of Statistics of the Department of Agriculture, the following are the estimated yields of cereals for the present year as indicated by the condition of the various crops on 1st September. (The final official returns for last year are given in brackets) :—Winter wheat, 556,000,000 (418,070,000) bush., being an average yield of 15·3 (15·2) bush. per acre; spring wheat, 343,000,000 (232,758,000) bush., or 15·2 (12·6) bush. per acre; all wheat, 899,000,000 (650,828,000) bush., or 15·3 (14·2) bush. per acre; barley, 236,000,000 (208,975,000) bush., or 25·9 (23·7) bush. per acre; oats, 1,477,000,000 (1,587,286,000) bush., or 33·2 (36·4) bush. per acre; maize, 2,672,000,000 (3,159,494,000) bush., or 23·5 (26·4) bush. per acre; rye, 77,000,000 (60,145,000) bush., or 14·1 (14·7) bush. per acre; linseed, 16,000,000 (8,473,000) bush., or 8·1 (4·7) bush. per acre. The condition of crops on 1st September was as follows (the average of the previous ten years in brackets) :—Spring wheat, 82.1 (72·0); barley, 81·5 (77.6); oats, 84·4 (77·6); maize, 67·4 (74·7); linseed, 72·6 (74·4). (*The London Grain, Seed and Oil Reporter*, 9th September, 1918.)

Brazil.—According to a report by the American Vice-Consul, dated 1st July, the Minister of Agriculture estimates this year's crop of beans at 350,000 tons. Before the war Brazil imported large quantities of beans, but domestic production now meets the demands of the country and leaves an exportable surplus. (*The London Grain, Seed and Oil Reporter*, 3rd September, 1918.)

India.—According to the final revised official estimate the area sown to wheat in India is given as 35,497,000 acres, and the yield as 47,478,000 qr. The special official forecast received in June gave the area as

35,342,000 acres and the yield as 47,525,000 qr. Last year's yield was 47,425,000 qr. (*The London Grain, Seed and Oil Reporter*, 23rd August, 1918.)

Japan.—According to the official forecast of the Department of Agriculture and Commerce yields of crops are estimated as follows, last year's figures being given in brackets:—Wheat, 3,708,000 qr. (4,209,000 qr.); barley, 4,838,000 qr. (5,687,000 qr.); rye, 4,747,000 qr. (5,084,000 qr.). (*The London Grain, Seed and Oil Reporter*, 6th September, 1918.)

South Africa.—According to the final official estimate issued from Pretoria on 15th July, the yield of maize for this season is given as 3,900,000 qr. as against 3,800,000 qr. last year. The acreage is 5 per cent. greater than last year, but owing to adverse weather conditions the yield is below normal. (*The London Grain, Seed and Oil Reporter*, 5th September, 1918.)

Live Stock in Denmark.—The numbers of live stock on the 5th February, 1918, are as follows (the numbers on the 20th February, 1917, being shown in brackets):—Horses, 510,615 (538,395); cattle, 2,141,684 (2,452,853); sheep, 247,213 (267,979); pigs, 513,012 (1,650,623). (*International Crop Report and Agricultural Statistics*, August, 1918.)

Live Stock in Sweden.—The numbers of live stock on the 1st June, 1917, are as follows (the numbers on the 1st June, 1916, being shown in brackets):—Horses, 715,101 (701,099); cattle, 3,020,381 (2,913,159); sheep, 1,344,202 (1,198,469); pigs, 1,029,967 (1,065,396). (*International Crop Report and Agricultural Statistics*, August, 1918.)

Agricultural Conditions in England and Wales on 1st September.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st September, state that the fine weather which prevailed through most of August was everywhere very favourable to harvest operations, and a great deal of corn has been got in under excellent conditions. The rain which occurred, mostly towards the end of the month, caused little delay or damage. In the north, the harvest is naturally not so far advanced, and there are more reports of the corn having been laid.

Wheat has proved to be the best crop of the year throughout the country; the ears are reported to be well filled, and straw of a good length. With an area under this cereal of 2,556,000 acres and a yield now estimated at 6 per cent. above average, a production in England and Wales may be anticipated of 10,500,000 qr., or fully 3,300,000 qr. more than last year. Barley is about an average in the north, but rather below in most other districts: the area this year is about 1,500,000 acres, and the total production should be nearly 6,000,000 qr. Oats, like barley, are more favourably reported on than a month ago, and the yield now appears to be but little below the normal. The acreage has been largely increased; and it is hoped that the 2,779,000 acres returned under this crop in England and Wales will yield 13,500,000 qr., or 2,600,000 qr. more than last year. Peas and beans are also satisfactory, and nearly average crops, though the latter, owing to aphis, are not quite so good as a month ago.

Potatoes are still most satisfactory, and remain unusually free from disease upon the whole. The area of 634,000 acres should yield some 4,100,000 tons of potatoes, or 750,000 tons more than last year.

Turnips and swedes, though some improvement is generally noted from most parts of the country, have not recovered from the dry weather of the early summer; and fields are often very patchy. Prospects indicate accordingly a poor yield everywhere. Mangolds, although also considered to have made a little improvement, cannot be marked any higher than a month ago.

Owing to frequent and persistent washings the hop plants are now much cleaner and in better condition, and an improvement in prospects is to be noted. The quality is expected to be good, but not more than about three-quarters of a normal yield is anticipated.

All orchard fruit is, as stated last month, extremely scarce.

The rains towards the end of the month have improved the pastures, which were often getting bare, but have now in most places a sufficiency of grass. Live stock are healthy; in many districts they did not thrive particularly well during the first part of the month, but their condition is now generally satisfactory.

Labour, both skilled and temporary, is still scarce, but with the help of women, boys, soldiers, and prisoners of war, the work has generally been satisfactorily performed, though root-fields in many districts are becoming foul. In many areas much of the corn has been cut by the use of tractors instead of horse-power, and this has been of material assistance in harvesting operations.

Summarising the returns, and expressing an average crop by 100, the appearance of the crops on 1st September indicated probable yields which may be expressed by the following percentages:—Wheat, 106; barley, 99; oats, 99; beans, 99; peas, 99; potatoes, 103; turnips and swedes, 89; mangolds, 95; hops, 74.

The following local summaries give further details regarding agricultural labour in the different districts of England and Wales:—

Agricultural Labour in England and Wales during August.

Northumberland, Durham, Cumberland, and Westmorland. — The situation remains much the same. Temporary labour is sufficient for the need. In some cases more use is being made of motor tractors in place of horses for harvesting.

Lancashire and Cheshire.—The supply of labour, both skilled and temporary, is deficient, and the shortage is being more felt owing to the unsettled weather. Help is being given by women, soldiers and German prisoners.

Yorkshire.—Skilled labour is scarce, and wages high, but generally speaking the immediate need has been met by the special arrangements made.

Shropshire and Stafford.—Skilled Labour is scarce, but temporary workers have filled the gap. Some farmers have used tractors very successfully with the binders.

Derby, Nottingham, Leicester, and Rutland.—The supply of skilled labour is very deficient, but with soldiers, women and German prisoners helping, the necessary work is being got through.

Lincoln and Norfolk.—Soldiers, women, schoolboys, and prisoners of war have met the need, and the harvest has not suffered.

Suffolk, Cambridge, and Huntingdon.—Labour is generally deficient; the fine weather during the greater part of the month considerably relieved the situation.

Bedford, Northampton, and Warwick.—The supply of labour, though occasionally short, is generally sufficient. Soldiers, women, and volunteer workers have rendered great assistance in getting in the harvest.

Buckingham, Oxford, and Berkshire.—Temporary labour has been sufficient, and harvest work has not suffered.

Worcester, Hereford, and Gloucester.—Labour is generally short but the fine weather has rendered the shortage less acute, and with the help of women, soldiers and prisoners of war, farmers have been able to get in the harvest.

Cornwall, Devon, and Somerset.—The supply of labour is short, but the good harvest weather has eased the situation Help is being rendered by women, soldiers, and German prisoners.

Dorset, Wiltshire, and Hampshire.—The supply of labour is generally short, especially skilled hands, but the work has been performed with the aid of women, soldiers, boys and German prisoners. Hoeing of turnips and mangolds is in arrears.

Surrey, Kent, and Sussex.—Labour is short, but the fine weather has to a certain extent compensated for this, and with the help of women, soldiers, and prisoners of war, farmers have been able to get in the harvest. Skilled labour is required for thatching, and considerable areas of roots have been left unhoed for want of labour.

Essex, Hertford, and Middlesex.—There ha been no serious difficulty, though the shortage still exists. In some places Government tractors have been a great help.

North Wales.—Though the supply of labour is scarce, work appears to have been kept well in hand, good assistance having been rendered by soldiers and German prisoners.

Mid. Wales.—Skilled labour is scarce, but temporary help has met the immediate need. Wages still tend to increase.

South Wales.—Skilled labour is lacking and temporary help is not always efficient, but good use has been made in some cases of mechanical help, and the fine weather has made everything easier.

Prevalence of Animal Diseases on the Continent.

THE following statement shows that according to the information in the possession of the Board on 1st September, 1918, certain diseases of animals existed in the countries specified :—

Austria (on 31st July).—Foot and-Mouth Disease, Glanders and Farcy, Sheep-pox, Swine Erysipelas, Swine Fever.

Denmark (month of June).—Anthrax, Swine Erysipelas.

France (for the period 21st July—3rd August).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-scab, Sheep-pox, Swine Erysipelas, Swine Fever.

Holland (month of July).—Anthrax, Foot-and-Mouth Disease, Foot rot, Swine Erysipelas.

Italy (for the period 29th July—4th August).—Anthrax, Black-leg, Foot-and-Mouth Disease, Glanders, Rabies, Sheep-scab, Swine Fever.

Norway (month of June).—Anthrax

Spain (month of May).—Anthrax, Black-leg, Dourine, Glanders and Farcy, Pleuro-pneumonia, Rabies, Sheep-pox, Sheep-scab, Swine Erysipelas, Swine Fever, Tuberculosis.

Sweden (month of June).—Anthrax, Swine Fever, Swine Erysipelas.

Switzerland for the period 22nd—28th July).—Anthrax, Black-leg, Foot-and-Mouth Disease, Rabies, Swine Fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Germany, Hungary, Montenegro, Rumania, Russia, Serbia.

The Weather in England during August.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 3rd Aug.:								
England, N.E. ...	58·1	—1·2	0·25	6	— 7	2	6·4	+0·5
England, E.	59·7	—1·2	0·73	19	+ 9	2	7·2	+0·5
Midland Counties ...	61·5	+1·4	0·50	13	0	2	6·4	+0·5
England, S.E. ...	61·7	+0·1	0·69	17	+ 7	2	6·7	—0·2
England, N.W. ...	60·9	+1·8	0·17	4	—16	1	7·5	+1·7
England, S.W. ...	60·4	+0·5	0·99	25	+ 8	3	7·1	+0·6
English Channel ...	62·9	+1·2	1·18	30	+18	3	9·5	+1·2
Week ending 10th Aug.:								
England, N.E. ...	60·4	+1·8	0·69	18	+ 4	3	4·5	—1·0
England, E.	60·6	0·0	0·27	7	— 5	3	5·3	—0·9
Midland Counties ...	60·9	+1·2	0·39	10	— 3	3	5·0	—0·6
England, S.E. ...	60·8	—0·7	0·41	10	0	4	5 8	—0·8
England, N.W. ...	60·4	+1·6	0·75	19	0	3	4·4	—1·0
England, S.W. ...	60·0	0·0	0·52	13	— 3	4	3·7	—2·5
English Channel ...	60·6	—1·4	0·47	12	— 2	4	5·6	—2·4
Week ending 17th Aug.:								
England, N.E. ...	61·1	+2·8	0·14	3	—12	2	6·9	+1·6
England, E.	62·0	+1·8	0·3	1	—11	1	8·5	+2·3
Midland Counties ...	61·3	+1·9	0·7	2	—12	2	6 6	+1·1
England, S.E. ...	62 0	+0·9	0·02	1	—12	1	9·1	+2·3
England, N.W. ...	60·2	+1·8	0·28	7	—12	3	5·6	+0·3
England, S.W. ...	60·6	+1·0	0·14	4	—14	2	8·1	+1·9
English Channel ...	62·7	+0·9	0·03	1	—13	1	10·2	+2·5
Week ending 24th Aug.:								
England, N.E. ...	62·9	+5·2	0·09	2	—15	1	8·1	+3·2
England, E.	65·4	+5·7	0·04	1	—13	1	7·9	+2·3
Midland Counties ...	64·0	+5·4	0·04	1	—16	1	7·1	+1·9
England, S.E. ...	64·0	+3·6	0·06	2	—13	1	7·2	+1·0
England, N.W. ...	61·3	+3·2	0·41	10	—14	3	7·1	+2·1
England, S.W. ...	61·3	+2·1	0·26	7	—15	3	5·7	—0·2
English Channel ...	63·6	+2·1	0·06	2	—14	2	6·8	—0·4
Week ending 31st Aug.:								
England, N.E. ...	56·4	—0·3	0·68	17	+ 2	4	3·0	—1·9
England, E.	57·7	—0·9	0·59	14	0	5	3·4	—2·2
Midland Counties ...	56·4	—0·9	0·97	25	+ 8	4	2·6	—2·3
England, S.E. ...	57·9	—1·6	0·49	12	— 5	3	4·4	—1·5
England, N.W. ...	56·8	0·0	1·27	32	+ 9	5	3·0	—1·5
England, S.W. ...	57·0	—1·0	0·95	24	0	4	3·6	—1·7
English Channel ...	59·9	—0·7	0·47	12	— 4	4	6·1	—0·3

* 1 inch = 25·4 millimetres.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (in 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
,, 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
,, 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
,, 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
,, 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
,, 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
,, 23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
,, 9 ...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
,, 16 ...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
,, 23 ...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
,, 30 ...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl. 6 ...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
,, 13 ...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
,, 20 ...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
,, 27 ...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May 4 ...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
,, 11 ...	55	5	78	0	73	5	53	5	64	11	56	6	33	1	55	2	47	6
,, 18 ...	55	0	77	11	73	4	52	10	64	10	56	6	33	0	55	2	46	4
,, 25 ...	54	7	78	0	73	3	52	9	64	9	56	6	33	4	54	11	47	8
June 1 ...	53	3	78	0	73	8	53	9	65	11	60	0	33	3	54	11	44	9
,, 8 ...	51	2	78	0	73	11	52	8	67	7	59	2	32	7	55	0	45	5
,, 15 ...	48	10	78	2	74	3	50	9	75	6	57	9	32	1	55	1	45	7
,, 22 ...	47	6	78	1	74	4	49	10	75	0	58	5	31	3	55	2	47	8
,, 29 ...	46	3	78	3	74	4	49	1	73	11	57	10	30	10	55	1	46	4
July 6 ...	46	3	78	1	74	4	45	6	69	5	61	7	30	8	55	2	46	10
,, 13 ...	48	11	78	2	74	4	47	5	70	10	57	5	31	6	55	1	47	0
,, 20 ...	51	6	78	3	74	3	48	8	72	1	60	5	32	3	55	2	45	4
,, 27 ...	53	5	78	3	74	3	47	2	65	7	56	11	32	5	55	2	46	2
Aug. 3 ...	55	1	78	2	74	3	46	1	73	6	57	1	32	9	55	0	45	10
,, 10 ...	56	7	78	4	74	7	46	11	76	1	57	7	31	2	55	0	46	3
,, 17 ...	58	1	78	7	74	2	48	0	68	11	61	4	30	8	55	6	55	11
,, 24 ...	59	0	76	7	74	8	47	1	70	7	62	6	31	6	54	7	56	9
,, 31 ...	59	4	72	1	74	8	48	5	60	4	60	1	30	5	49	0	57	11
Sept. 7 ...	59	3	71	6	72	3	51	7	59	3	60	4	31	1	46	7	56	9
,, 14 ...	59	11	70	7			52	6	57	2			30	9	45	0		
,, 21 ...	59	4	70	8			53	3	56	10			30	9	45	8		
,, 28 ...	58	10	70	6			54	1	58	5			31	1	44	7		
Oct. 5 ...	59	2	70	8			54	5	57	9			30	9	44	9		
,, 12 ...	59	7	71	0			53	10	58	5			31	6	44	5		
,, 19 ...	60	9	70	8			53	8	59	3			31	11	44	1		
,, 26 ...	62	10	70	10			54	6	60	1			32	10	43	0		
Nov. 2 ...	66	7	70	4			56	2	59	11			34	0	42	4		
,, 9 ...	69	8	70	3			58	0	60	2			35	8	42	11		
,, 16 ...	70	9	70	3			59	8	60	2			37	8	43	0		
,, 23 ...	70	8	70	2			61	8	59	9			39	7	43	1		
,, 30 ...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec. 7 ...	72	1	70	7			65	6	58	7			44	1	43	5		
,, 14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
,, 21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
,, 28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in August and July, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	August.		July.	
	First Grade.	Second Grade.	First Grade.	Second Grade.
FAT STOCK :—	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
Cattle :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Polled Scots	75 3	70 0	75 3	70 0
Herefords	75 4	70 1	75 3	70 0
Shorthorns	75 1	70 1	75 2	69 11
Devons	75 3	70 0	75 6	70 0
Welsh Runts	—	70 0	75 0	70 0
Fat Cows	70 0	62 1	70 0	61 11
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	*d.*	*d.*	*d.*
Veal Calves	14¼	12⅛	16¾	13
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ *s.*	£ *s.*	£ *s.*	£ *s.*
Shorthorns—In Milk ...	53 4	41 6	51 3	39 6
,, —Calvers ...	50 8	39 14	47 18	37 16
Other Breeds—In Milk ...	47 2	37 17	45 7	36 13
,, —Calvers ...	—	—	35 0	33 10
Calves for Rearing	3 16	2 13	4 6	3 1
Store Cattle :—				
Shorthorns—Yearlings ...	17 10	14 16	17 5	14 10
,, —Two-year-olds...	27 1	22 18	27 1	22 11
,, —Three-year-olds	35 13	31 10	34 15	30 12
Herefords—Two-year-olds...	31 18	28 6	31 0	25 11
Devons— ,,	28 8	24 16	28 19	24 8
Welsh Runts— ,,	26 0	23 0	25 5	23 0
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Downs or Longwools ...	54 3	45 10	53 1	45 0
Store Pigs :—				
8 to 12 weeks old	48 10	36 3	57 4	42 4
12 to 16 ,, ,, ...	83 7	66 8	90 7	71 6

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins or pelts, which during August made prices equivalent to an additional 1*d.* per lb. of the carcass weight for Downs, Longwools, Blackfaced, Welsh, and Cross-breds, and 1¼*d.* for Cheviots, and during July 1*d.* per lb. for Downs, Longwools, Cheviots, Blackfaced, Welsh and Cross-breds.

AVERAGE PRICES of DEAD MEAT at certain MARKETS i ENGLAND in August, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	Quality.	Birmingham.		Leeds.		Liverpool.		London.		Ma ches
		per cwt.		per cwt.		per cwt.		per cwt.		per c
		s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*
BEEF :—										
English	1st	114	6	114	6	—		114	6	114
	2nd	114	6	114	6	—		114	6	114
Cow and Bull	1st	114	6	114	6	114	6	114	6	114
	2nd	114	6	114	6	93	6	98	0	95
Irish : Port Killed ...	1st	—		—		114	6	114	6	114
	2nd	—		—		109	0	114	6	114
Argentine Frozen—										
Hind Quarters ...	1st	129	6	129	6	129	6	129	6	129
Fore ,, ...	1st	99	0	99	0	99	0	99	0	99
American Frozen—										
Hind Quarters ...	1st	127	0	—		—		127	0	—
Fore ,, ...	1st	97	0	—		—		97	0	—
Canadian Frozen—										
Hind Quarters ...	1st	122	0	—		—		122	0	—
Fore ,, ...	1st	9:	6	—		—		92	0	—
VEAL :—										
British	1st	114	0	114	0	114	0	114	0	114
	2nd	—		112	0	88	6	92	0	86
Foreign	1st	—		—		—		—		—
MUTTON :—										
Scotch	1st	121	6	121	6	121	6	121	6	121
	2nd	121	6	121	6	121	6	121	6	121
English	1st	121	6	121	6	—		121	6	121
	2nd	121	6	121	6	—		121	6	121
Irish : Port Killed ...	1st	—		—		121	6	—		121
	2nd	—		—		121	6	—		121
Argentine Frozen ..	1st	121	6	121	6	121	6	121	6	121
New Zealand ,, ...	1st	121	6	121	6	—		—		—
Australian ,, ...	1st	—		—		—		—		—
LAMB :—										
British	1st	121	6	121	6	121	6	121	6	121
	2nd	121	6	121	6	121	6	121	6	121
New Zealand	1st	121	6	121	6	121	6	121	6	121
Australian...	1st	—		—		—		—		—
Argentine...	1st	121	6	121	6	121	6	121	6	121
PORK :—										
British	1st	—		149	6	149	6	149	6	—
	2nd	—		149	6	—		149	6	—
Frozen	1st	—		—		—		149	6	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in August, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d. per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.	*s. d.* per 12 lb.
BUTTER :—						
British	—	—	—	—	26 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	233 6	—	233 6	—	233 6	—
CHEESE :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
BACON :—						
Irish (Green)	—	—	—	—	—	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	45 5	42 11
Irish	40 1	—	39 7	37 9	39 9	38 0
Egyptian	—	—	—	—	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Duke of York... ...	170 0	152 6	—	—	153 6	141 6
White Kidney ...	177 6	145 0	175 0	152 6	152 6	140 0
Other First Earlies ...	175 0	142 6	152 6	132 6	137 6	127 6
HAY :—						
Clover	—	—	—	—	157 6	150 0
Meadow	—	—	—	—	157 6	150 0

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	AUGUST.		EIGHT MONTHS ENDED AUGUST.	
	1918	1917.	1918.	1917.
Anthrax :—				
Outbreaks	21	18	176	329
Animals attacked	29	21	202	377
Glanders (including Farcy) :—				
Outbreaks	—	2	23	18
Animals attacked	1	4	65	32
Parasitic Mange :—				
Outbreaks	226	137	3,471	1,872
Animals attacked	409	227	6,596	3,627
Sheep-scab :—				
Outbreaks	6	4	252	395
Swine Fever :—				
Outbreaks	119	138	995	1,713
Swine slaughtered as diseased or exposed to infection	55	67	401	747

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	AUGUST.*		EIGHT MONTHS ENDED AUGUST.	
	1918.	1917.	1918.	1917.
Anthrax :—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy) :—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange :—				
Outbreaks	8	8	87	37
Sheep-scab :—				
Outbreaks	21	36	203	271
Swine Fever :—				
Outbreaks	5	29	17	179
Swine slaughtered as diseased or exposed to infection	13	103	58	1 063

* Including figures for weeks ended 20th and 27th July, 1918.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at *certain Markets during the Month of August*, *1916, 1917,* and 1918.

—	WHEAT.			BARLEY.			OATS.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
London ...	58 5	78 2	76 2	49 2	64 1	—	32 6	55 7	59 5
Norwich ...	56 0	77 11	75 2	44 7	64 9	57 0	32 0	54 9	59 0
Peterborough	57 0	77 11	74 8	43 4	65 11	56 6	31 0	55 3	55 10
Lincoln ...	58 7	78 0	74 3	—	—	—	33 5	—	—
Doncaster ..	57 0	78 0	74 5	—	—	—	32 10	54 11	—
Salisbury ...	57 8	78 1	74 0	46 3	72 4	58 1	31 0	55 0	45 1

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THE JOURNAL
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Vol. XXV. No. 7.

OCTOBER, 1918.

EDITORIAL NOTES.

Women's Work on the Land.

THE series of articles on women's work on the land published in this number of the *Journal* constitutes a new departure, in that it represents the first of occasional issues which it is proposed shall deal with a given subject from various points of view by different writers. It was felt that such a departure would serve a useful purpose, since it would not only set forth the views of various authorities but would involve fairly full accounts of the subjects under discussion. The great work which is being done by women in connection with food production is deserving of the widest recognition, and the workers certainly deserve the first consideration in the publication of such a series of issues as that contemplated. Women have entered the field—in the literal sense of the word—in all branches of farm work, from motor-ploughing to thistle-cutting, and from stock-rearing to thatching and hedging.

In spite of difficulties due to a number of causes—lack of physical strength, lack of training, initial want of organisation, feminine idiosyncrasies—it may be said that on the whole the work of the women on the land has proved a conspicuous success. We commonly hear of farmers, who at first refused the aid of women to replace their men who had joined the Forces, being finally induced to give women a trial—with the result that they no longer wish to be without their women helpers. Articles in this issue show how women are helping on the land, how they are being trained, and the difficulties that are being overcome, whilst one article gives an account of successful farming by women in Devonshire, and another by Sir A. D. Hall discusses the position of women in agriculture.

and the possibility of co-partnership farming. As so many farmers will now largely depend on woman labour to carry on the work of their farms, they are likely to find this series of articles of the highest interest.

* * * * *

Increased Food Production.

WHEN addressing a representative meeting of farmers a few weeks ago, the Rt. Hon. R. E. Prothero, M.V.O., M.P., President of the Board of Agriculture and Fisheries, stated that in the National Agricultural Programme for next year the first item must be the maintenance and, if that was humanly possible, the increase of our area under bread-corn, whilst the second item was the increased supply of animal food. The need for an increased home production of bread-stuffs is not the less because the harvests both in Western Europe and the United States have been good. Though the bread-stuffs are in existence, the need for diverting all available tonnage to war purposes is greater than ever. The Allies will need to draw heavily for corn on North America, and every ton that has to be brought to Europe by so much reduces the strength of the American Army in Europe. Above and beyond that, however, it will be essential for this country after the War to concentrate more than before on the home production of the necessary foods, and particularly bread-corn. In his address to farmers, referred to above, Mr. Prothero remarked that the nation, if only as an assurance against blockade, would demand from the land at home a greater production of bread-stuffs. "We cannot forecast with accuracy what the required area will be," he said, "but it will anyhow greatly exceed the arable acreage of 1918. These two national needs—one the need of utilising to the full the soil which is our greatest reserve of raw material, the other the need of ensuring against outside pressure by the home production of more bread-stuffs—are, as it seems to me, a guarantee to the farmer that he will not find his arable land a burden."

At the present time, the most important foodstuffs required are bread-corn, potatoes, milk, bacon, beef and mutton, and in preparing next year's programme farmers should bear these items continually in mind. *The policy of food production should be regarded as essentially an insurance policy*—a policy which will guard against calamity and overcome all possibility of shortage of any of the essentials. In regard to the ploughing policy, farmers, as Mr. Prothero has said, will only be asked

to plough land which is capable of growing good crops and roots, and they will only be asked to plough even this if, in the opinion of the County Executive Committee, they have sufficient labour to cultivate as well as to plough.

* * * * *

Feeding Stuffs.*

WITH regard to the increased supply of animal food the essential point to be remembered by the farmer is that he himself must grow more of the feeding stuffs for his stock. It can hardly be supposed that in the near future we can rely on even the bare necessities for our stock, other than milking cows, being imported from America. In the view of Mr. Prothero, " The summer and autumn are not the difficulty, but, if imported supplies of cake and grain are cut off, what can the dairy farmer or feeder do when his grass has failed to provide meat and milk throughout the winter and spring? I believe there is no other answer to that question except this: He must do as his fathers did in the days when no imported feeding stuffs reached these shores. He must grow more of the food himself, not only roots and green fodders, but oats and beans. If the outside world cannot send him food for his stock in the winter, he must feed them himself from the produce of his arable land." What has been said points to the utmost possible use of the existing arable land and to the improved management of the grass land unsuitable for ploughing—the urgent need is to maintain or extend the area of corn and to increase the production of home-grown feeding stuffs for stock. In the words of the President, " Without more animal food we shall go badly short of meat in the late winter and early spring months of 1920. It is only by an increase of arable land that these two needs can be met."

* * * * *

Manures.

IN order to make the best use of our arable land and to improve our grass the greatest possible attention should be given to the conservation of farmyard manure and its effective employment. As indicated in the Notes on Manures at p. 860, artificial fertilisers are not obtainable in unlimited quantities, so that farmers will need to consider very carefully how they may best employ them. It cannot be too strongly emphasised that they should be ordered early, that is, *without delay*, even though they may not be required for use until spring. Farmers should there-

* See also pp. 864, 888-94 and 915.

fore estimate as nearly as possible what their requirements of fertilisers will be, *order them at once*, and on receipt take the very greatest care to ensure proper storage. Close attention should be given to the importance of lime.

* * * * *

Settlement of Ex-Service Men on the Land.

ATTENTION is specially directed to the Circular Letter published at p. 875, dealing with the object of the Small Holding Colonies (Amendment) Act, 1918. It is generally agreed that it is highly desirable to provide facilities for the settlement of soldiers and sailors on the land at the time of demobilisation, and the hope may be expressed that the County Councils will do all in their power to this end. The letter shows what steps may be taken in order to ensure the provision of land, and points out that the Soldiers and Sailors (Gifts for Land Settlement) Act, 1916, empowers the Board, or a County Council, to accept and administer gifts for the settlement of ex-soldiers and sailors on the land. Private individuals, therefore, who are in a position to make gifts, may wish to take advantage of the Act and afford valuable aid in increasing a settled rural population.

* * * * *

Short Notes from Farmers.

THE Editor will at any time welcome from farmers and others short practical notes dealing with agriculture, horticulture and the allied industries, with a view to publication in the *Journal*. Such notes might describe processes not commonly known, methods of meeting emergencies due to the War, implements found useful locally but not widely distributed, successful cases of co-operation, good results due to exceptional farm or garden practice, high crop yields, the improvement of arable or grass-land, the reclamation of waste or derelict land, and so forth. Illustrations may prove of interest and value. While it cannot be guaranteed that all such notes will be published, they will all be carefully considered, and certain of them will be included in the *Journal*, as at present, with or without the name of the writer, as desired.

THE POSITION OF WOMEN IN AGRICULTURE.

SIR A. D. HALL, K.C.B., F.R.S.,

Permanent Secretary, Board of Agriculture and Fisheries.

Before the War.—The difficulties attending the entry of women into the business of agriculture were already very manifest before the War: the large numbers of women who have come to the assistance of the country by taking up work upon the land have, of late, only made the problem more apparent. In those earlier years at the various agricultural colleges open to women, and at the many private venture institutions, many of which were of a somewhat unsatisfactory character, increasing numbers of women were obtaining a training in agriculture, fruit growing, dairy work, and poultry-keeping. But at the end of their education they were rarely able to obtain satisfactory openings whereby to put their knowledge into practice. In far too many cases they were induced to take a small holding, a poultry-keeping business, or some still more hypothetical enterprise, and embark the little patrimony they possessed before they had any real experience of the commercial side of farming. Many of the businesses thus purchased were economically impossible; not infrequently they were plainly fraudulent—intended to exploit the sanguine expectations of women without experience, and in the vast majority of cases they of necessity ended in failure and the loss of the small capital upon which the women depended. Of course, numerous instances of success in these small businesses may be quoted, where the intelligence of the woman seized upon an opening that was not perceptible to the ordinary routine cultivator, but the failures were all too frequent.

Putting aside the few examples of women possessed of considerable capital and rural connections who embarked upon the ordinary business of farming with the same measure of success as would have attended men entering under the same conditions, in the majority of cases women were not able to attempt ordinary agriculture but took up some of the minor businesses dependent upon the land, and, as a rule, they attained their success by raising produce of the luxury type and by catering for a clientele of amateurs.

New Situation Due to the War.—The War has created a new situation. Large numbers of women have gone to work upon the regular business of cultivating the land, and have taken their share in the management of horses and stock, and in the operations of a normal farm. Though for the moment they

are only replacing the agricultural labourer and are earning nothing more than the labourer's wages, they have thereby obtained a working acquaintance with practical farming and an insight into its difficulties and necessities that they could not have reached before. Many of these women are now determined to remain upon the land and take up farming as a career. The problem is how to provide them with that career in view of the fact that the majority of them possess little or no capital, and that farming, like every other business, cannot be entered upon without the expenditure of a certain amount of capital.

The Small Holding.—The most obvious solution would seem to be a small holding that will reduce the initial outlay of capital at risk and yet will give the woman a foundation upon which she may hope to build up an adequate business. At all times, however, and in all circumstances, small holdings represent a difficult economic proposition, and one, moreover, that involves special disadvantages to women. Though the initial outlay of capital may not be large, still capital is required, and the risk of the total loss of that capital is probably greater than would be the case with a larger farming business run upon more routine lines. The chief economic disadvantage from which women suffer lies, however, in the fact that on a small holding the actual labour of the occupier contributes the larger fraction of the income, and the hours of labour required are such as tax the endurance of a man in full vigour. The occupier of a small holding has to make up by longer hours and more intense industry for the necessary physical disadvantages attached to the size of his holding. He has, for example, to do with a spade work which on a larger farm would be done with a plough, and though the result may be better, the gain is not in proportion to the outlay of personal labour. Over and above the actual labour of cultivation, the small holder has the labour of marketing which, by reason of the smallness of the lots of produce, calls for a considerable expenditure of skill, energy, and physical exertion. It is, of course, always said that co-operation will minimise the difficulties of marketing and reduce the call upon the occupier's personal exertions, but it must be remembered that the co-operative marketing of small holders' produce is, in this country, more of an ideal than a fact. The organisation is still very imperfect, it exists in but a few centres, and the majority of small holders have to depend upon their own skill and their personal exertions in order to find a satisfactory market.

Large Farms.—In considering the entry of a new class of women or, for the matter of that, of men, into agriculture, we must begin with the cardinal principle that within limits the larger the farm the sounder is the economic enterprise it presents. Whatever the style of farming adopted, whether large-scale cultivation for arable crops, stock-keeping, or intensive cultivation for fruit and flowers, there is only a certain profit per acre to be derived. Comparing like with like, the output per acre is no greater from a small holding than from a large one. It is true that if pasture is turned into spade-cultivated market gardens the production is enormously multiplied, but this intensification depends not upon the small holding, but upon the change of system. The produce per acre from a market garden of 100 or even 1,000 acres can be just as great as that from one of 5 acres. The rate of output depends, in fact, upon the system of farming adopted, and not upon the size of the holding. On the other hand, the expenses of cultivation diminish with the size of the holding. Labour-saving machinery can be introduced, organisation of effort comes into play, and many operations, such as spraying and dealing with disease, which are expensive and wasteful of time and materials when they are applied to a small area of the crop in question, can be efficiently organised when a larger area has to be dealt with.

It is often contended that the small occupier can give greater personal attention to details and so deal more successfully with crops like fruit and vegetables. This, however, is not necessarily the case, nor does it generally maintain. The organising abilities of the large cultivator generally ensure that, in practice, his fruit trees are better trained and pruned, more effectively protected from disease, and again, that his dairy stock are better cared for than is the case with the small holder engaged on a similar business. Again, on a large holding, the management expenses are reduced because they are spread over a wider area. The capital outlay on a small holding is, further, increased out of all proportion. Fencing and roads alone form a considerable charge per acre on the output of the small holding. Since the profit of farming depends fundamentally upon the gross output per acre, and on the large farm the necessary expenditure on capital, cultivation and management is less than on the small holding, the divisible surplus which may be made available for the workers must be greater.

Co-partnership Farming.—The question is whether a means can be organised whereby that surplus can be passed on to the worker and not wholly absorbed by capital and management:

if so, a share in a large farm worked as a single enterprise ought to produce more to the worker than would obtain from his portion of the land if he has to work it as an independent unit. So fundamental is this principle that it may be illustrated by a concrete example, taking pre-war costs and prices.

Let us consider a large farm cultivated intensively for fruit and vegetables. For each 100 acres about £2,000 capital would be required. The expenses of management may be set at £1 an acre = £100 in all. Payments to labour will amount to about £1,000, *i.e.*, a labourer per 5 acres, and the gross profit would also amount to about £1,000. Out of this gross profit £100 has to go to management and another £100 to interest on capital, leaving £800 as the net profit. If this £800 were divided amongst the labourers it would give them a further 15*s*. a week and raise their remuneration from 20*s*., their ordinary wages, to 35*s*. a week.

Now let us suppose the same 100 acres to be divided into holdings of 5 acres each for the 20 labourers employed upon it on the large farm. Each small holder would require about £150 capital. Then, if he or she obtained the same gross proceeds per acre, £20, the income of the small holder would only be £100—practically the same, if interest on capital is considered, as the labourers on the large farm obtained.

In order, however, to obtain the same gross proceeds per acre, the small holder would have to make up by extra labour for the advantages obtained on the large farm by the use of labour-saving machinery and by the organisation possible in large scale working, and also for the economies derived from buying and selling on a large scale. The physical strain upon the worker is consequently far greater, the risks are greater because the small holder has no reserve wherewith to meet one or two bad seasons, and the small holder's capital as well as labour is at stake in the operation.

One factor in favour of the small holder is that if he or she has a fortunate season or two and possesses special aptitudes for the work, there is a possibility of making the business grow and gradually transforming it into an undertaking large enough to pay for labour and leave the occupier to management only. It should be observed that this ambition explicitly postulates the conception that a large farm is better than a small one and is the ultimate aim of the occupier. It is clear that only a minority can progress in this fashion. For the great majority the question is whether it is preferable to earn the return that

can be obtained from the unit area of land as a labourer working under direction or as an independent farmer. If, for the considerations advised above, the average income is likely to be at least as great in one case as in the other, then a preference may be given to the large holding farmed in partnership, if only because of the diminution of the risk to the individual that is thereby involved, for it must never be forgotten that starting a small holding has a very considerable element of speculation attached to it, and that a large proportion of failures occur even amongst men picked from a community well accustomed to living upon small holdings.

Co-partnership Farming Scheme for Women.—Granted these preliminary considerations, we may proceed to consider the sort of scheme which would give the method of partnership in farming a fair trial amongst women.

In the first place, there are many reasons to suggest that the trial farm should be one mainly occupied with fruit-growing and market gardening. Not only does this type of business involve a smaller initial outlay of capital in proportion to the turnover and profits, but the manual work to be performed is on the average less physically exacting, calling for concentration of effort, endurance and skill rather than the extension of considerable physical strength at any moment. If, further, it be assumed that the scheme will first be tried amongst comparatively educated women, fruit and vegetable growing offer greater opportunities for intelligence and skill than does the work of an ordinary mixed farm.

The Land.—The scheme would propose to take an area of about 500 acres of good land suitable for intensive cultivation, preferably in an undeveloped state in order that the colony might be built up gradually and populated by degrees as more and more of the land was brought under intensive cultivation. The land must be good—it would be ruinous to handicap the scheme with unsuitable soil—and considerations of transport and proximity to markets would require just as much consideration as would be given to them by an individual capitalist embarking upon a commercial enterprise.

Management.—Given the land, the next step is the engagement of a good manager, not only skilled in cultivation, but accustomed to marketing and with a thorough knowledge of such farming from the business side. It should be a matter of indifference at the outset whether this manager should be a man or a woman. The success of the enterprise depends upon obtaining real capacity at the head.

Labour.—One may assume that there would be a certain amount of labour upon the land at the start, which labour need not be hastily dispensed with, because for some time a regularly increasing stock of labour will be required as the intensively farmed area extends.

The women who offer themselves for work in the colony would be engaged at first only in such numbers as the year's programme of cultivation determined. The women would be taken on as labourers at a weekly wage, and for the first year, until they had proved their quality, they would be probationers with no claims to a share in the undertaking. After the first year, if they were found suitable they would be accepted as members of the colony and would thenceforward be entitled to their share in the profits. As the planting extended and the call for labour increased, further women would be taken on. In so far as they were unskilled, each of them would be put to work during their probationary year, alongside one of the more experienced women, and they would, in their turn, become "partners" in the enterprise. In the course of five or six years the place would be developed up to its maximum capacity of employment of labour and would settle down into regular running as a partnership farm.

Reserve Fund.—When the accounts were made out at the end of each year, as a first charge a proportion of the profits would have to be put aside for a reserve fund intended to provide the dividend or addition to wages in years when the profit was small or none. It must always be recognised that farming is a business in which the returns fluctuate considerably with the seasons. Hence it is necessary at the outset to build up an equalisation fund of this description.

Division of Profits.—After this provision the remainder of the profits would be divided *pro rata* between capital, management, and labour. If the capital has only been put in at ordinary rates of interest it is clearly entitled to some share in the profits in consideration that the enterprise is more speculative than an ordinary investment. The most equitable method of assessing the share which should accrue to capital would seem to be to allow the fixed interest on the capital to rank for dividend *pari passu* with the payments to management and to labour. It is, in fact, one of the necessary outgoings of the business like the payments to labour and management, and that is equally entitled to its share in the profits.

Working the System.—The working of the proposed system will be more apparent by an approximate estimate of the

finance. For convenience it will be necessary to calculate in terms of money and wages at pre-war rates. A farm of 500 acres will be required, of which we may assume that about 300 would be suited to market gardening and fruit growing, the remaining 200 being only useful for grazing or less intensive cultivation. The purchase price of such a farm may be set at £15,000, which capital would not be in any way at risk, and which would be covered by an annual rent or mortgage charge of, say, £700 a year. This charge would, of course, have to be met before the gross profits were estimated. As working capital about £8,000 would be required, reckoning that 300 of the acres would cost £20 an acre, and 200 £10 an acre, to stock. This being liquid capital employed in the business must be regarded as subject to risk of loss, and should receive interest at the rate of 6 per cent. apart from its share in further profits.

The expense of management may be set down as one manager at £300 a year and an assistant manager at £150 a year, each, of course, having a *pro rata* share in the profits.

On such a farm in full working order about 70 partners could be employed, and the wage bill at a minimum of 25*s.* a week would amount to about £4,500 a year.

The gross profit that might be expected from such a farm when in full working order, after paying rent, management, interest on capital, labour and all expenses, would be about £4,000 a year. Putting 20 per cent. or £800 to the reserve fund, there would remain £3,200 available for dividends. The outgoings eligible for dividends consist of

	£
Interest on working capital (£8,000 at 6 per cent.)	480
Management	450
Labour..	4,500
Total	£5,430

As £3,200 is available for distribution the profit would amount to a dividend of a little less than 60 per cent., equivalent to a rise in the manager's salary from £300 to £475 a year and in the weekly wage from 25*s.* to 40*s.*

The reserve fund would be allowed to accumulate until it was equal to one year's ordinary wage bill, after which it would not be necessary to raise it any further. It should always be invested in some security outside the business, and the interest accruing on it should be paid into the profit fund available for dividend.

In order to give the women admitted into partnership still further interest in the undertaking they should be able and,

indeed, encouraged to invest a portion of their annual dividends in the enterprise, so as gradually to pay out the capital. On the sums so invested interest as stated above at the rate of 6 per cent. would be paid, together with what further dividend accrued from the capital's share in the profits. The partners should at any time be able to withdraw this capital, which should be repurchased by the undertaking, and when any of the partners cease to work upon the farm they should, as a matter of necessity, be paid out. A partner leaving the farm, however, would have no title to share in the reserve fund even though in the early years of the working of the enterprise she had contributed by her labour to build up this reserve fund.

In the early stages of the enterprise it would be inadvisable to give the partners any voice in the management, because success or failure depends so entirely upon the direction and business capacity of the manager. Any woman joining the farm would have to come on the understanding that she was liable to dismissal if her work proved unsatisfactory. The probationary year would, however, provide a testing time for both employers and employed. As the scheme got finally established, and as the partners began to accumulate capital and have a substantial interest in the concern, it would be desirable to give them seats or even a majority upon the Board of Management. Indeed, the ultimate idea is that the partners should own the whole of the capital and be collectively responsible for the management, however much they may delegate the direction to an individual.

Mode of Life : Community System.—The next point requiring consideration is how the women working upon the farm will live. Clearly, if they are to be self-supporting upon the exiguous incomes derived as labourers (and our prime postulate is that the majority of the women possess no other source of income and must be self-supporting), some system must be devised by which their expenses will be reduced to the lowest possible extent. This can only be attained by building up some form of community which will admit of low rents and possess a common kitchen and messing arrangements in order to minimise the cost of feeding. It will be necessary in the first place, therefore, to have a community house containing a common kitchen and dining rooms, common rooms for society and recreation, and a certain number of bedrooms which can be let at rates within the means of women engaged upon the farm. In addition to the community house, cottages should be erected which should either be taken singly or jointly by the women.

A certain amount of variation should exist both in the living room and the cottage accommodation so that the residents could adjust their mode of living to their income. The woman, therefore, who possesses a small income of her own would be able to run either a house of her own or otherwise to use her independent income to secure a better style of living. Again, there will be variations in the incomes which the different women derive from the farm itself, as some of them are promoted to act as forewomen or assistant managers, and the object should be to enable this difference of income to be applicable to the mode of living of the individual, while those who are on the lowest scale of wages may still be able to be self-supporting. The purpose of the community house would thus be, not to secure a uniform institutional mode of existence, but to leave as much freedom and diversity as possible on a fundamentally economical basis.

The finance and management of the community house and the cottage arrangements must be treated as an entirely separate undertaking from the farm. It should be managed by a paid manager acting under a committee of the residents. Assuming that the farm will possess a good house which would serve as a nucleus of the community, and that about 20 further cottages will require to be erected as well as the additions to the central house, the capital required for the housing arrangements will amount to about £10,000. This capital would be only at risk to the extent of about one-quarter, since one may safely consider that the cottages would always be required by the developed farm, and that their cost could be realised if the experiment failed and the undertaking came to an end.

Married Women.—One point requires consideration—the position of married women in such a community, or of women who marry when they are workers upon the farm. In the first place I think it must be assumed that in the experimental colony men must be excluded as partners in the enterprise. The prime object of the experiment is to test to what extent women can make themselves self-supporting in agriculture, and the experiment would be jeopardised if it is so conducted as not to throw the whole of the work of every kind upon women, or if any adjustment has to be made to represent the relative working powers and earning capacities of men and women. At the same time there is nothing in the conception to prevent the employment of married women, and it should be open to any of the women partners to marry and to reside

in one of the cottages on the estate, though the husband would need to find his employment elsewhere. Adjustments of the working hours of these married women would also be possible with a corresponding adjustment of the wages they receive.

The Appeal to Women.—In discussions of the scheme considerable diversity of opinion has been manifest as to whether the idea of such a community life will appeal to women. On the one hand many people think it will, and they point out the experience of women's colleges and settlements as showing that such a society as would be afforded by the community house is congenial to the habits and wishes of a large majority of women. While they would all be earning comparatively narrow incomes they still would be able to live upon them, and would, it is expected, have sufficient leisure to be able to build up a society with reasonable amenities of its own. In this respect one of the greatest objections to the attempts of educated women to work upon the land and to live upon small holdings would be overcome. Such women find themselves extremely isolated and cut off from all society of their own kind in the country. They occupy an anomalous position and are rarely able to associate either with their fellow small holders or with the residents of the district in which they are working. In such a community as is under consideration they would be working with a number of women in the same circumstances as themselves, and the narrowness of their income would not act in the way it usually does in cutting them off from all society of their own kind.

On the other hand many people hold the idea that such a community existence would be repugnant to women. They, it is said, in the first place want an establishment of their own, and their desires would be very much better met by an independent small holding, however small, which would at least give the feeling of a personal existence capable of expansion and growth. To this one must answer with the hard fact that a small holding requires some capital, results in failure in a comparatively large proportion of cases, and is only successful at the expense of a life of drudgery. The outlook of a labourer upon such a community farm may not seem to be very tempting — an average income of, say, £2 a week — but that does represent the maximum which a single-handed worker can earn out of the soil with all the advantages of organisation and with all the profits of farming diverted to the worker. No schemes of co-operation, of assisted purchase of a holding, of loans of capital, or any other extraneous system, can increase the gross

earnings from the land, and the whole point of the enterprise is to secure that the worker gets the maximum of the earnings that can be won from the land without having to risk her own capital, existing or borrowable. Of course the return is low, but it must be insisted that it represents the best the land is capable of earning.

Doubtless, women can earn better incomes upon the land by teaching, by organising, and in certain cases by managing for other people, but these are professional occupations demanding a considerable preliminary expenditure of capital in procuring a technical training, and they do not bear upon the question of how the woman is to live by the actual business of farming if she possesses no capital of her own whereupon to start in the position of a manageress and not of a labourer. At the same time the conception that many women will have the ability to make a successful start as small or large farmers with any capital they may possess is by no means excluded. They would be very much more likely to make a success of such an enterprise after they had spent some time upon such a community farm, and it may be expected that a considerable colony of independent holders will eventually grow up round the community farm, these holders having, after getting their experience upon the farm, taken up land on their own account. Naturally a system of co-operation for purchase and marketing between the small holders and the colony could readily be organised and would tend to make the small holders' position more lucrative and more stable.

To sum up the proposed scheme. What is required is, in the first place, a farm suitable for development under intensive cultivation and preferably of about 500 acres in extent. Because of the period the experiment would require for its realisation and the development that would have to be put into the land, it is practically necessary that this farm should be purchased. For this purpose about £20,000 would be required, but as the capital value of the land would considerably appreciate and not be at risk it should not be difficult to raise this prime sum, considering the importance of the experiment from the point of view of the future position of women with regard to agriculture. A further sum of approximately £10,000 would be required for stocking and carrying on the business of the farm. This would be ordinary trading capital, and its ultimate recovery must be regarded as dependent upon the success of the enterprise. This capital is, therefore, at risk and would have to be raised from private sources, though, perhaps, a contribution

might be obtained from public funds towards expenses in the initial stages of the enterprise when the farm was getting into a self-supporting state. As, however, the capital would be put into the business, which would be conducted upon normal lines as regards management, the risk of loss of the whole or the greater part of this capital would not be great. A further £12,000 would be required for housing purposes, of which about £3,000 would be liable to loss because it would be sunk in adapting the central farm house to community purposes. The cottages on which the rest would be spent would always form a realisable asset, though all building, even of cottages, within the next few years must involve a certain ultimate loss of capital. On the whole this capital for housing purposes would have to be provided from private sources, though a State contribution may be expected towards the cost of building cottages as part of the State housing schemes which will prevail all over the country.

WOMEN IN AGRICULTURE DURING WAR-TIME.

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EARLY in the War, when men were offering themselves in large numbers for military service, it was obvious that action must be taken to fill the gaps in the labour market at home—agriculture and other vital industries had to be maintained and a new supply of labour called in. From whence could this labour be obtained? In the shops and factories, on the trams and railways, and in the dockyards women were already beginning to do men's work, adapting themselves to the new conditions and responding to the call of the country.

The Origin of the Official Women's Organisations.—Lord Selborne, who was Minister for Agriculture in 1915, decided that for farm work also the help of women must be secured. He turned to the existing machinery of the Labour Exchanges, and invited the help of the Board of Trade to co-operate with the War Agricultural Committees already established in every county, and to set up *Women Farm Labour Committees*. In Berkshire, where the need had been foreseen, a Women's Committee was already established, and others quickly followed upon a similar plan. In some counties they were appointed as Sub-Committees of the War Agricultural Committees, in others on more independent lines.

Early in 1916, the writer was appointed as the first Woman Inspector of the Board, to work in close co-operation with the women inspectors of the Board of Trade; while later in the same year the Ministers concerned agreed to the transference of the Women's organisation from the Board of Trade to the Board of Agriculture.

The foundations had already been securely laid by Miss Durham and her colleagues, to whose zeal and ability in those early days lasting gratitude is due. From voluntary associations also the Department received much valuable help—women of the educated class were being enrolled as members of the Women's National Land Service Corps, a war offshoot of the Women's Farm and Garden Union, and it is those women who may be called the pioneers in the whole movement.

By careful organisation and by commonsense methods in training the women for the work for which they were best fitted, the Corps was able to offer efficient labour to the farmer, and to gain the confidence of the public. It has since been appointed as the Agent of the Board for the supply of seasonal workers, and has this year enrolled 3,000 women from the Universities and elsewhere to work in the flax-pulling camps.

The next step in the organisation of women farm labour was taken by Mr. Prothero, shortly after his appointment as President, when in January, 1917, he decided to form a Women's Branch of his Department. He appointed the first Woman Inspector as Director, and Mrs. Alfred Lyttelton as Deputy Director, and entrusted to them the somewhat novel task of organising a woman-staffed division within a Government Department. The times, however, were unusual, and the need for fresh effort was urgent—there was the continued drain upon the man-power of the country for the needs of the Army abroad, and with the heavy shipping losses there was the ever-present need for increasing the home-grown food supplies. Every effort had to be made by men and women alike to meet the situation.

When Mr. Prothero formed the Food Production Department of the Board, the Women's Branch became a part of the new Department. Its main task was greatly to increase the supply of woman farm labour, and to secure its efficiency and employment. It was only through the voluntary organisations set up in every county that this difficult task could in any way be accomplished.

As British people, we have for generations been used to seeing much of the public work of the country done by private people,

local residents, without any question of payment, but solely for the public good. Such voluntary service is one of the proudest of British traditions.

Since the War, this public spirit of men and women has shown itself in countless directions—but surely nowhere more strikingly than by the members of the voluntary Agricultural Committees now established in every county of England and Wales. The success of the Board's schemes for increasing the country's food and maintaining an adequate supply of labour and machinery depends upon the work of these Committees. They, and only they, know the local agricultural conditions, so infinitely various in our island country, and can make effective the general policy of the Government.

On the women's side of the organisation the generosity and zeal of the voluntary workers have been equally conspicuous. The members of the Women's County Committees have at much cost to themselves, both of time and money, given constant oversight to the work with all its many details and difficulties. In several counties to-day the Women's Committee has realised the importance of getting a corporate feeling among all the workers, from the Village Registrars to the County President, and has adopted a regular system of election by ballot. The county is divided into districts resembling Rural Districts. Each District Committee is elected by the Village Registrars of the area. The District Committee elects representatives for the Central Executive Committee. Thus the County Executive is not merely a body nominated by a few individuals, but it is appointed by the wish of all those concerned in the work throughout the county. It is representative in fact as well as in name.

Since the War, women have been called not only to do men's work in field and factory, but also in many unexpected places in the public service. Experience has already proved that their shortcomings—which women are the first to recognise—are the result of want of training rather than of zeal or capacity. On the War Agricultural Committees women, while giving so generously of their time and interest, are realising the responsibilities of public service, and gaining generally from the experience.

Women's Pre-War Prejudice.—The task entrusted to this body of voluntary and official workers was certainly no easy one. It must be remembered that before the War women did very little regular labour on the farms, except in Northumberland and in some of the neighbouring counties, although they

were employed in large numbers in such seasonal jobs as fruit- and hop-picking and in the potato fields. Taking the country as a whole, however, it may be said that regular farm work for women had gone out of fashion, and that in so far as any of it was still done by them it was by women of the least educated and least respected class in the village. This was largely due to the low scale of wages offered for the hard work demanded of them. Thus the idea that the work was degrading to the women themselves had first to be eradicated. This has been achieved largely by the example and hard work of many hundreds of educated women who have taken up farm work out of patriotism, and have joined either the Land Army or the Land Service Corps—or given a lead in their own village. Not only has this example induced many young women of a similar class to offer themselves, but it has brought a new spirit into the villages, where work on the land has assumed a new dignity, and is no longer regarded as unfashionable. Nothing is more valuable to the farmer than local labour of a regular and efficient kind, and the greatly increased number of village women now at work is one of the most encouraging results of our efforts.

Farmers' Objections.—Another formidable difficulty has been the prejudice of the farmer, stiffened in many cases by the opposition of his women folk. Many farmers contended that women had neither the will nor the stamina necessary for the work, and others were influenced by the very natural feeling that "the ladies" should not be asked to do the rougher work, and that they would not be of much practical use unless they did do it! Then the farmers were fearful that by employing women they would be bereft of their few remaining men. The Tribunals did their best to remove this misunderstanding, but even when not genuinely believed it served a useful purpose in stiffening the farmers' opposition to woman labour For the women who enrolled in the newly-formed Land Army —a body to secure a mobile supply of whole-time workers— there has been a greater uncertainty of employment and less favourable conditions than in other war services. Women for the munition factories and for such corps as the W.A.A.C. and the W.R.N.S. were recruited to meet an immediate and known demand, whereas the fate of the farmers' men was to a large extent still hanging in the balance. The liberation of soldiers for agricultural work, and the fact that this form of labour was liable to be withdrawn at very short notice, made the demand fluctuating and uncertain.

The women therefore came into the agricultural world under conditions about as discouraging as could be conceived. Full acknowledgment, then, should be given to the fact that their measure of success is due to their own demonstration of practical usefulness.

Organising the Women's Land Army.—While these various difficulties had to be faced, the organisation of the newly-formed Women's Land Army had to be carried through with the utmost speed. The County Committees set up their selection boards, formed training and hostel committtees, finance committees, and appointed store superintendents for the distribution of the outfits. The co-operation of the Ministry of Labour and the Ministry of National Service was sought and generously given, as well as that of the Army Clothing Department—and when the arrangements were in order for the selection, allocation, training and equipping of the women, the first recruits were enrolled, in March, 1917. Since that time the Land Army has, under many difficulties, proved a steadily growing and improving source of labour, and has supplied some 16,000 women for farm and field work, irrespective of those passed directly for the Timber Supply and Forage Departments.

Training.—The training of the women has been a difficult problem. There was no time to be lost; women with some sort of skill were wanted as quickly as possible—would a four- or six-weeks' training be of any value? It is quite obvious that to be skilful at farm work and to understand the different operations, experience is necessary both for a longer time and through the succeeding seasons—but under war conditions this has not been possible. All that could be done, except in a few special cases, was to give the woman a good start—to harden her muscles, test her character and strength, and teach her something of the right use of farm implements and of the care of young stock. This the short course has done; it had perforce to be left to the farmers to do the rest. The material upon which they and we have had to work has been raw and untried. The women knew it themselves, but they came forward eager to do their best. They were full of grit and determination, and with all the limitations of technical equipment, we felt that we had much that was very promising to work upon. We were dealing with youth and with the elasticity of youth.

All those candidates who had not come up to standard in the matter of health and character were being rejected or released

as unsuitable. Those accepted had the great advantage of the twentieth-century education; they had been taught to learn and to think for themselves. In many cases, of course, bad surroundings or mechanical work had warped the powers of body and mind and a sense of responsibility, but we found that the training was usually sufficient to counteract the mischief if the material was sound at the bottom. There was a freshness and an alertness about the women which has been acknowledged by the farmers as having proved no small asset in the labour market. The farm labourer, especially in those counties where wages were low and conditions bad, had got into a groove. He had lost the sense of initiative and individual judgment. He had, as a farmer said the other day, "got lumpy." This same farmer remarked with approval that the girl he employs is "light on her feet and light with her hands and thinks for herself." "I'd a deal rather have her with cows," he said, "and she is first rate with a horse—doesn't treat him like a machine." This girl had, as I knew, been a typist in a small city office and was barely twenty years of age

Having admitted then that we had had perforce to send out material which required a good deal of moulding by the farmers themselves before it could be called anything like the finished article, and admitting, moreover, that the new labour was apt to be somewhat lacking in stability even when it had proved its technical value, we claim (and we foresaw this) that the newly-trained woman of the summer of 1918 has a greater practical value than the woman of the summer of 1917. She has had the ground prepared for her in countless ways, and we ourselves have learnt how to equip her to more immediate practical advantage. She is, moreover, less diffident and more sure of a welcome. We claim that women's labour has proved itself a worthy substitute for male labour in a time of emergency, not only by what women have attempted, but by their actual achievements. We claim more than this; we say that in spite of the fact that a woman's working methods are different temperamentally from those of a man, she has proved (and it has come as a welcome surprise to the farmers) that she is capable in many kinds of farm work of achieving the same ends. We venture to think also that she has been a factor in widening the sympathies and the judgment of those who watched her first efforts with some scepticism and who accepted her labour with so little willingness. By "sympathies" I mean very practical consideration in the matter of a decent living wage, of the necessity for good housing,

and for some personal consideration as to health, bad weather and hours of work. The farmer will be none the worse for this loss of some of his conservatism. Here, however, I should like to say that to those far-seeing and enterprising men who have been our fellow pioneers in the venture the country owes a lasting debt. It has been a great privilege also to have had the willing help of some of the farmers in the matter of billeting and arranging of hours, and it is this awakening interest in the welfare of his employees which we feel may develop into a wider interest in agricultural conditions generally.

Successful Work of Women in Agriculture.—If we are asked to say in what branches of agricultural work women have so effectively proved their efficiency that it will never be questioned again, we should mention more particularly milking and dairy work, the care of young stock, certain kinds of field work, and the lighter branches of forestry. The work of women in such occupations as threshing, thatching, and driving motor tractors has also been remarkably successful, and the whole survey tends to prove that it is rather in the heavier and more monotonous kinds of work (which her predecessor probably accomplished with ease) in which the present-day landswcman fails. Manual work of that kind, without variety or change, tends to weary her physically and mentally and is apt to produce a reaction which has, I believe, been responsible for more misdemeanours than any other cause. It will be rather those kinds of work, therefore, which require knack, deftness of hands and personal interest and care which will make the success of the women in the future, whilst the more scientific branches will appeal to the woman of good education.

It is, of course, a matter of conjecture as to whether there will ultimately be a place for the woman farm labourer, or whether those women only will be employed who are equal to managerial capacity or of specialising in one of the scientific branches of farm work. I asked a south-country farmer the other day what he personally would do if his man came home to-morrow unwounded and asking for his old job. He considered deeply for a few moments, and then gave a very decided answer. "I should keep the girl," he said, "and, perhaps, two girls. I should set them to milking and dairying, and I should keep more cows. I would get them to work with the horses and see to the stock, and there would be plenty left for my man to do." He added, "I should feel that I had lost a rare good thing if I let the girls go, and there's many a farmer I know who will say the same thing when the time comes."

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FIG. 1.—Haymaking. Note the practical attitude of the Girl in the Foreground.

FIG. 2.—Oats on old Park Land, sown in Spring. The Woman Worker is 6 ft. in height.

FIG. 3.—Oats on old Park Land, and Women Workers.

FIG. 4.—Women Singling Roots.

FIG. 5.—A County Tractor and Women did all the work in this field, the only man being the Tractor Driver.

FIG. 6.—This Gang cleared 6 acres of Winter Oats in one day, releasing the other men and binders for cutting.

Fig. 7.—Women Loading Potatoes.

Fig. 8.—Bagging Potatoes.

FIG. 9.—Women Thatching.

FIG. 10.—Women assisting at Stacking.

The Effect of Land Work on the Women.—There remains, then, the position from the point of view of the landswoman herself. Her success and her good service to the farmers in a time of crisis are proving themselves, but the benefit which she herself gains showed itself from the beginning of our work and will continue to show itself to the end—and, as we hope, after the War is over.

To begin with, we have dealt with thousands of young women and girls from the manufacturing towns of England and from the London slums; we have called them out of unwholesome surroundings and from occupations that were failing to develop either body or mind; we have called them from a life which demanded nothing more of the faculties than a ceaseless drain on their wits and their nerves, and have pointed them to a standard both of mental and physical efficiency. We have asked them to accomplish something more than the mere drudgery of earning their daily bread, and have given them a definite interest and purpose in life. Can the benefit or the wholesome pleasure in the new work be doubted by those who have any knowledge either of slum life or of existence in those towns, where a dead level of wage-earning respectability spells monotony and the entire absence of ideal? To those who have known the town girl of this class as she was and who watch her as she is now, the altered conditions cannot fail to be a matter of pure joy and satisfaction.

We have dealt also with the girl of country traditions who was possessed of latent inherited powers (on which the farmers set great store) and who only needed to have those powers developed, and she has proved a very valuable factor for encouragement to the raw town recruit, over and above her own efficiency. I believe that the mixing of the town and the country elements will not be the least satisfactory result of our work.

It may be that all who have not attained to more than an ordinary standard of efficiency will, in the end, go back whence they came, but it cannot be otherwise than that they will take back with them a freshness of outlook and a standard of living which will bring a very wholesome leaven into their old surroundings, though the prevailing conditions may be too strong, and, unaided, this freshness may fade away. It is not too much, therefore, to hope that some care and some measures will be taken by those who will again be responsible for them, to build upon the foundations which have been laid in the time of national stress and abnormal needs.

There is no doubt that many of the landswomen will refuse to go back to the old life, and will be made keener for

success in land work by the sound condition of competition which will return when the War is over. To those women who have proved their mettle we can promise that there will not be lacking organisation which will afford them all possible help for future enterprise.

It has been remarked by some of the critics of the scheme that the very fact that so much organisation, discipline and welfare work have been found to be a growing necessity as a background to accomplishment, is proof enough that the young women of the uneducated class are not the right material for the responsible work of agriculture. To this it may be replied that it will be those women (and, of course, there have been many such in an emergency enterprise) who have only been kept up to the mark by ceaseless supervision and discipline who will in the natural course of events be the first to drop out of the agricultural market. This must be so, when the emergency demand for women's labour ceases, and we only hope, as has been said before, that the efforts which have been spent upon them may by some means be continued. It must be, however, that for a year or so, at any rate, after the War, female labour of a quite ordinary standard will be urgently required. Demobilisation is likely to be a somewhat lengthy business, labour conditions can only adjust themselves by degrees, and the production, on a large scale, of home-grown food will still be a vital necessity to the nation.

It would be absurd to suppose that organisation with supervision and welfare efforts could be relaxed for those of the women who, for the time being, remain. It must never be forgotten that we are dealing with women who, on account of that very youth which gives them the zest and energy required for the work, need much in the way of assistance, restraint and advice. We hope that in time, when this power that shall be behind the new workers has put those of them who have benefited by it well on their way, has further trained and equipped them, and has either sent them to new ventures overseas or given them ownership or posts of responsibility in their own country, the women will be found able to organise themselves and will become an intelligent and effective power in the world of labour The organisation already set in motion should adapt itself to the new needs, and by facilities for training, scientific or practical, carry on all that is possible of its present work.

NOTE.—**The Land Army Organisation.**—The Women's War Agricultural Committees were asked to set up Selection Com-

mittees to select the recruits for the Land Army, and Instruction and Depot Committees to organise the training and placing of the girls. Each county was requested to provide a depot to which the workers could be sent between terms of employment. A voluntary Outfit Secretary was suggested who would also superintend the sale of boots to village workers. A Welfare Committee was recommended to look after the well-being of the workers. The already existing Village Registrars and District Representatives were charged with the duties, not only of registering local labour, but of inspecting farms and billets for the Land Army.

The general method of organisation and the complexity of the work are best illustrated by an account of the necessary steps which a recruit has to take.

1. A recruit who has signed one of the forms of enrolment, which can be obtained at every Employment Exchange, receives a summons from the nearest Employment Exchange in her district to appear before a Joint Committee of the Employment Exchange and the District Selection and Allocation Committee of the W.W.A.C. at a particular hour on a certain day. Her railway ticket to the place mentioned is sent to her.

2. She is interviewed by the District Selection and Allocation Committee who decide :—

(*a*) That she is sufficiently skilled to go straight to a farm as a paid worker.

(*b*) That she requires six weeks' training at a centre.

(*c*) That she is quite unfitted for agricultural work.

3. The Ministry of Labour arranges for a medical examination. When finally accepted, the recruit fills in a measurement form for her equipment, and is sent, if she has no previous experience, to a training centre.

4. When the recruit has had six weeks' training the County Secretary and the County Committee place her, and send her a railway voucher for her journey. The L.A.A.S. worker is told to apply to the Village Registrar or to the County Secretary if she is in any difficulty.

5. Welfare officers have recently been appointed to watch over the welfare of the L.A.A.S., inspect their billets, arrange for their recreation, etc. A handbook has just been issued, conveying useful information on many practical matters.

6. A Good Service ribbon is awarded after six months if the L.A.A.S. has given entire satisfaction, and a Distinguished Service bar for any special act of devotion connected with her work.

THE WOMEN'S LAND ARMY.

THE HON. MRS. ALFRED LYTTELTON, D.B.E.,
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THE Land Army appeared in the world of agriculture suddenly, and with glowing hopes of the important position which it was to fill, only to find that it was destined to fight for a place. That the worker had started out with high ideals was in accordance with our own desires, and in that spirit we had enrolled her. We knew that she would have to go through much before she even approached the position she had hoped for, but we also knew that she would prove the more successful for this very enthusiasm.

She went through her period of disillusionment. She watched her friends and neighbours of the munitions factories, and had every opportunity of comparing their wages with her own. She also saw that they filled an instant and recognised need. Then for a time the bitter cry went up: "What is the use of enrolling if the farmers do not want us?"—and some of her kind fell from the ranks in despair. The rest held on doggedly, and at last came the turn for the better.

It had been no easy matter for the farmers themselves to know what their needs would be. Soldier labour was uncertain, and the attitude of the Local Tribunals with regard to their men was perforce subject to the condition of affairs at the Front. As the summer of 1917 wore on, however, the labour shortage began to increase, and in some parts of the country the Tribunals became less lenient. By June and July there was a rapidly rising demand for skilled women, such as milkers and stock-women. The spirits of the women themselves went up with the growing demand, and enrolments increased. And so by her own grit and determination, by the power of organisation behind her, and with the kindly helping hands of many of her employers, the girl in the Land Army scrambled "over the top" and began her work in good earnest, with an enthusiasm which went far in itself to convince the farmers of her good faith.

The Land Army, however, had its troubles, even then. The new work and the new conditions were an easier matter for the women of country traditions, whose minds were accustomed to work in a groove, but for the town girl there was indeed much to which she had to adapt herself. She had been dependent for her mental nourishment upon the changing scenes of street life and on ceaseless companionship. She had

now to accustom her brain to the continued concentration of skilled work, and to school herself to complete her tasks without questioning weather or inclination. She was at first much disposed to leave uncongenial tasks as soon as she had had enough of them, but the very quickness and versatility of her brain stood her in good stead.

There were also minor troubles in the matter of billeting; the failure at times to make the weekly wage go as far as it should; the physical fatigue of newly-awakened muscles; the bewildering discovery to the novice that the employers' methods were not always those of the training centre; and then sometimes the new clothes which had been donned with so much joy of heart did not fit or wore out before their time!

Perhaps it is because she is so curious a mixture of quick perception and irresponsibility, a creature of moods and sudden unaccountable impulses, that there were at first more of these troubles than there need have been. The girl of the less educated class is quick to see what is wrong, but she is strangely reluctant to go the direct way of setting the trouble straight. Nine times out of ten she will follow the dictates of temperament instead of those of common sense, and both the farmers and ourselves have freqnently had to wade through labyrinths of complications resulting from one small mishap. This state of things is disconcerting to an employer, but applies as a rule to the class of girl who is only suitable for unskilled or gang work. The better educated class of woman is reasonable enough, and frequently gives great help in the way of controlling her less steady companion.

The very ordinary and feminine troubles which seem to the novice so hard to bear probably go far towards winning the kindly chivalry and interest of those who have to grapple with her inexperience. When all is said and done the girl on the land is a creature full of grit and spirit and goodwill. Her uncertainties and her moods may all be directed into the right channel, provided that the foundation is sound. As was natural enough after generations of experience of the stolid farm labourer, the farmers were inclined at first to take their new workers too seriously. After many surprises and some trepidation they have learned, as we have learned, that with the majority of girls these troubles are only storms in the domestic teacup, and that a little humouring or firmness soon restores the working equilibrium.

It is interesting to notice that the better educated and more thoughtful amongst the farmers gain the best results

from their women workers. They know how to handle them and to make use of their very freshness, and above all to give them that interest in their work which is the first and last appeal to women. They seem to have learned as time went on that there are more ways than one of accomplishing a job. The new labour was apt to exhibit what may be termed temperamental surprises, but it did not follow that it lacked technical ability or the willingness to work.

Speaking of his training experiences the other day a farmer said that he reckoned his successes in the matter of training women as 50 per cent., and of the rest he would put less than a quarter down as direct failures. "But you have to watch your girls," he said, "the same as you would a new sheep dog. They all have their different methods of getting at things. You may get a girl who does not shape well at first, does not want to milk, pretends she's frightened of cows, and does not do much in a field, but if you are going to put that girl down as a failure then and there you are likely more wrong than she is. You may bide a bit and then try her with a horse, and maybe a plough, and you may find her the best girl ever you had." This is admirable, but we realise that the ideal training makes large demands on the time and patience of a busy man.

With all her faults and failings one cannot but have the liveliest admiration for the girl in the Land Army. Her keenness and grit, the very carelessness of life which has so often brought her into trouble, have kept her buoyant through many a task that was somewhat beyond her normal powers of accomplishment. The pride which she takes in her newly-found health and strength is a delightful thing.

We are often asked what percentage of women fail through ill health or the lack of sufficient strength for agricultural work. It is difficult to make an exact estimate, as failure frequently results from more than one cause. The latest returns to the Employment Exchange show, however, that approximately 16·1 per cent. of the women passed for agriculture fail on medical grounds. Considering the fact that a large number of our women have come from the towns, this percentage may be considered surprisingly low.

There is, indeed, no more satisfactory side to our work than the daily evidence of improved health, physique, and mental vitality of the women with whom we have to deal. The girl of country upbringing has gained a new and much-needed sense of responsibility, and of the privileges which are hers by right. The old restlessness which sent her and her kind flocking to

the towns in search of excitement may give place to a sound interest which will enable her to make life in the rural districts of England her own.

With regard to the town girl, it is impossible for anyone who has not known intimately the existence of the poorer type of the labouring classes in the towns, to realise the vivifying power of natural surroundings on stagnant minds and enervated bodies. The same good result could not have been gained, of course, without the power of organisation behind. The workers of the rougher type are literally hedged in by organisation, and by ceaseless thought for their physical and moral welfare. Apart from the question of health, it must be admitted (and this applies to nearly all classes of the women employed) that some thousands of inexperienced or semi-experienced women sent into the labour market, irresponsible to a certain point, and entirely incapable of looking after their own collective interests, would have been just so much material wasted. With the best will in the world the Labour Exchanges could not have found time to deal with the daily problems which have to be faced, and the need for welfare organisation increases with every year of the work.

The fate of the poorer class of town girl after the War gives rise to anxiety. It is impossible not to feel apprehensive on her account. The unwholesome conditions of her home life and the pitiless nerve-wracking restlessness of the streets make her shiftless and irresponsible; the dulling stagnant work and the long hours in the factory bring no interest and no development to mind or body. Even during this long war of suffering she has known better things than these, and it is for us who are responsible now, and for those who will be responsible in the future, to ensure that she does not lose her new hold on life and its possibilities of happiness. If, during the last two years, she has known small wages, she has eaten good and wholesome food. If she has known loneliness, it has been for her to see the rolling spaces and the great growing forces of Nature, which by their own virtue have brought life and health to her cramped spirit. The girl in the Land Army has deserved well of us, for she has given her services bravely and with little actual reward; she has been content at times with rough living; and, except in a few instances, she has not been among the strikers for higher wages. Undoubtedly the appeal to her patriotism has not only caused her to enlist in the Land Army, but has helped her to face and endure hard work under hard conditions. "It's not so bad as what our

boys have to put up with" is by far the most common answer made by the Land Army girl to any sympathetic inquirer; and another comment is heard even more often—"It's lovely work—I never want to go back."

Before very long this desire of the women who love the work, to stay on the land, will have to be recognised. Careful schemes of emigration must be framed and carried through; already a register is being kept of those now in the Land Army who have the ambition to become settlers. We, believe, too that there will be a place in England for skilled landswomen after the War. The new aim of making our country as nearly as possible self-supporting in the matter of food means, even with the great increase of mechanical help, a large demand for labour. If we can train up every year a band of young women who will become the true partners and helpmates of country men, we shall have made a great step forward in the reconstruction of rural England.

THE TRAINING OF WOMEN ON THE LAND.

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Pre-War Conditions.—Education in any form of work has almost invariably the effect of raising the status of the worker as well as of improving the standard of the work. In no form of labour is this more apparent than in agriculture. A century ago woman labour in agriculture was very usual, but, as scholastic education became more general, the more intelligent workers sought other fields of employment, and the work on farms (which included dairying, poultry-keeping, etc.) drifted, by degrees, into the hands of the less well-educated women. In certain districts the woman land worker was considered as socially inferior to the domestic servant.

The first serious attempt to give any training or education to women in agricultural subjects in England or Wales was made about the year 1895, when the county councils were given the administration of the "Whisky" money for the purpose of technical instruction. Some county councils were much more favourably disposed to agriculture than others, and the opportunities in the different counties varied to a very considerable extent. For women, the principal instruction given was in dairying. The result of this, as years went by,

was most marked; the produce of the country gradually attained a higher standard, a more intelligent class of worker was attracted to the industry, and the status of the worker was very much raised. The subject has been dealt with in a comprehensive *Report on Agricultural Education for Women* issued by the Board of Agriculture, in 1915.*

War Conditions.—Soon after the outbreak of war, labour conditions on the land began to change, and people with foresight realised that it would be necessary for women to take their share in agriculture as well as in other industries. The chief difficulty at that stage was the fact that there were very few women indeed who had any practical experience of actual farm work, though a large number had knowledge of dairying and poultry-keeping. The first move was made by a few patriotic women, chiefly of the educated class, who realised that a need for them would arise. Their initial difficulty was to obtain such training or experience as would enable them to be of some use on the land. A certain number made arrangements to become students for short terms at such of the Agricultural Colleges and Schools as were able to accommodate them. Others arranged with individual farmers to get practice on the farms. In nearly all cases these women paid for their own training, or worked for a definite length of time without wages until competent. Others turned their attention to horticulture with the idea of releasing gardeners for the Army, and the system they adopted for training was somewhat similar to that employed by their sisters in agriculture. When trained, these women had to find work. It is interesting to note that at first employers were much more inclined to look with favour on the woman gardener than on the woman farm labourer. These pioneers deserve great credit, for they had an exceedingly difficult "furrow to plough."

The first organised attempt to train substitutes for male labour was made by the Board of Agriculture and Fisheries in 1915. An arrangement was entered into with the various Agricultural Colleges and Farm Institutes to train milkers and farm workers. The Labour Exchange Department of the Board of Trade undertook the work of finding the women and placing them in employment, the Board of Agriculture providing scholarships for the training. In the first experiment only 2 weeks' training was given, but this was soon found to be totally inadequate, and the period was extended to 4 weeks.

* See this *Journal*, December, 1915, p. 859.

This experiment served to prove that after a short period of training women could become of definite use on the land.

In the autumn of 1916 the Board of Agriculture extended the facilities for the training of women land workers by offering to Local Education Authorities grants which would cover two-thirds of any expenditure they incurred in that particular direction. In addition to these grants a number of £4 scholarships were awarde dproviding for a 4-weeks' course of instruction at certain recognised institutions. This provision is still available, and has been of the utmost value. It is granted under the condition that the applicant is passed by the Women's War Agricultural Committee and that she guarantees to give a stated period of service on the land after training. It has been taken advantage of by several of the voluntary organisations which have secured land workers, and by individual persons who have desired training in order to be of more use. It has, however, more directly benefited women of the farming community who, suddenly called upon to undertake unaccustomed work, owing to the withdrawal of the men, have been very glad to avail themselves of the privilege. In certain districts the influence of these scholarships has been most marked; the scholarships have demonstrated the value of some form of training, and have aroused the desire for more knowledge, which should have a very beneficial effect in the near future.

During 1915 an experiment in the same direction was made by the Women's Farm and Garden Union. A farm in Essex was lent to the Union by Lord Rayleigh, and a training centre established upon it. A woman superintendent, who had had experience of all farm processes, was appointed and made responsible for the training of the women. The period of training was fixed at 12 weeks, and the students had to take, in turn, instruction in all forms of farm work. The cost of the instruction was undertaken by the Union, but the students, in most cases, paid for their maintenance. The whole of these women found employment immediately upon completion of their training, and after a period of nearly three years are, almost without exception, still employed upon the land, usually occupying responsible positions as instructresses, forewomen, etc.

The outcome of the experiment was the formation of the Women's National Land Service Corps in 1916 under the able direction of Mrs. Roland Wilkins. The women recruited are of the educated type; the majority are trained under the auspices of the Women's Farm and Garden Union at the various

farms which have been lent to the Union by different members. When the numbers have been at any time too great for these farms to deal with, various Agricultural Colleges and Farm Institutes have offered facilities. The training has always been for a period of 6 weeks, and has definitely been given in such a way that the women become either cow-women or horse-women. The majority of the members pay for their maintenance whilst training, but a certain number of free trainings are given, the expense of such being met by subscriptions to the Corps. A report of the work of the Corps is published annually. The effects of the work of the Corps have been far-reaching, as the Women's Land Army has been enabled to obtain from amongst its members a large number of women who are employed as instructresses, group leaders, and forewomen in the Land Army.

In 1917 the Women's Land Army was formed, and the methods of training adopted are briefly as follows :—

1. Training under the bursary system.
2. Training at a practice farm.
3. Training at an organised centre.

Under the bursary system the farmer is allowed to have a recruit for three weeks without paying any wages, the Land Army in the meantime making an allowance for the maintenance of this recruit. The farmer agrees to train the woman in the work for which he requires her and afterwards to give her employment. The chief drawback to this system is that in many cases the farmer only trains for one particular process; when the season for that work is over the woman is no longer required, and it then becomes necessary for her to have other training before she is of much use to another employer.

Under the practice farm system the farmer undertakes to train one, two or more women for a period of from 4 to 6 weeks. In return for training he has the labour of the trainees, the Land Army, meanwhile, giving maintenance to the recruits.

At the end of the training period the farmer does not employ his own trainees, who are then transferred to paid employment on other farms, but he may be supplied with fresh recruits.

The results which have been obtained from this method have been varied. The success depends upon—

(*a*) Whether the farmer is able to gauge fairly correctly the amount of work which may be given to a "raw" recruit.

(*b*) Whether the farmer has method and skill in imparting instruction.

(*c*) Whether the farmer has sufficient time to supervise the work of his trainees.

The last point is of great importance, for in certain work (*e.g.*, milking) it is very necessary that close supervision should be given until the trainee has reached a fair degree of efficiency.

In the third method, namely, the training centre, arrangements are made for the recruits to reside together in one central hostel, which is under the supervision of an instructress and a housekeeper. The hostels are usually established on farms where there are adequate facilities for training a large number of recruits, or in the centre of a district where there are several farms suitable for training. There are several very obvious advantages in this system. The instructress is able to give her whole attention to the work of training. Being experienced herself in farmwork, she is able to gauge the strength and suitability of the recruit for the various kinds of labour. She is able gradually to increase the amount of work given to the recruit, and can stop at once any recruit who is over-eager at the outset and attempts work in excess of her powers of endurance.

The recruits, who are chiefly town women, often find rural life very strange at the start, and settle much more happily if placed, at first, with companions of their own age. The fact also of having these women together renders it possible for " esprit de corps " to be established, and for steady determination to be encouraged as the first enthusiasm cools.

During the first six months after the formation of the Land Army the period of training was restricted to four weeks, but it became very obvious that the woman who was to be of use to the farmer must receive as much training as it was economically possible to give, and the period was, therefore, extended to six weeks. At the same time " efficiency tests" were instituted, with the objects of encouraging the recruits to make every endeavour to become competent, and of giving the organising secretaries some idea of the skill of the candidate, so that women could be suitably placed.

The extension of the period of training has had most marked results. It has been found that the last two weeks of training usually greatly improve the efficiency of the recruit as compared with the end of the first month. It gives her more confidence and she becomes much more used to country conditions.

The whole policy adopted in training is to make the recruit suitable for the class of work required, and in the majority of cases the training is definitely given in stock or horse work,

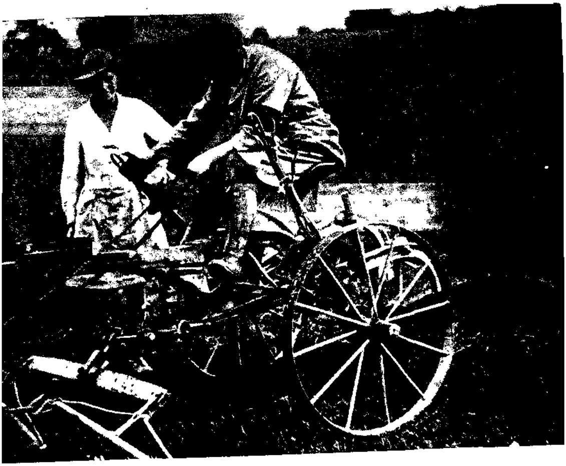

FIG. 11.—On a Syracuse Plough.

FIG. 12.—Training Women in clearing Gorse.

FIG. 13.—Welsh Women at Work.

FIG. 14.—Welsh Women at Work Stooking.

though there are exceptions to this rule, as in some counties the general farm labourer is most in request and a little of both types of work is included.

In addition to the foregoing it has been found necessary to supplement the training with certain special subjects, such as thatching, hedging, etc. For such training special classes are usually held in connection with the training centre, or, where the training is being given to women already in employment, at some central place where the women can meet after their working hours.

Special centres have also been arranged for the instruction of women tractor drivers. These are run on very similar lines to the ordinary training centres, the instruction being given specially in the management of the tractors, of the various implements attached to them, and in the general work of cultivation. As the demand for women drivers is increasing, it has now been decided that the tractor representative for the county shall be supplied with a certain number of recruits to be placed for work and training under skilled operators. The period of training in this section is similar to that of the ordinary Land Army, namely 4 to 6 weeks.

Another branch of work which received attention during the winter of 1917–1918 was the planting of forest trees. Short courses of instruction were given in the Forest of Dean by the Office of Woods, with the object of securing a number of forewomen capable of dealing with the gangs of women labour working at afforestation.

In addition to the training mentioned above, various local educational authorities and voluntary societies have helped in the movement, and it is interesting to note that the general conclusion arrived at is that a period of 6 weeks is the minimum length of time in which a totally inexperienced woman can hope to harden her muscles, accustom herself to climatic changes, and become sufficiently skilled to be of real use in this work.

Local Labour.—One of the greatest benefits arising from the establishment of the Land Army has undoubtedly been the encouragement of local labour, both skilled and unskilled. An ideal has been created, and there are clear indications that many of the women who comprise the present rural population are much more anxious now to have training than they were two years ago, and are availing themselves of any opportunities that arise. At the moment the subjects in which they appear most desirous of receiving training are milking, hedging, and thatching.

Horticulture. — From statistics it is possible to get an approximate idea of the increased numbers of women who are engaged in farm work, but in the case of gardening this is not so easy. It is more than probable that at present the numbers of women who are engaged in some form of gardening or other food production work is far in excess of those who are doing farm work, and that the increase in this direction during the War has been far greater. In the Land Army a certain proportion of the recruits receive a short training in gardening, and are afterwards employed by market gardeners, but are not allowed to work for private employers. The total, however, is not great, as so much of the work is seasonal, and many of the market gardeners prefer local labour which can find other occupation at slack times. The increase in the number of private women gardeners, however, is very considerable. Some of these women have had trainings, of varying periods, at one of the Horticultural Colleges or at private schools; others have started as garden labourers and gained experience through their work. Still larger numbers are either partially or wholly working their own gardens, often combining with this either goat- or rabbit-keeping, and, until food became scarce, poultry-keeping. The efforts made to obtain instruction and the success attained by many of these women, are most interesting. Gardening periodicals, text books, and leaflets have been most closely studied, lectures have been attended when available, and advice has been obtained from local gardeners.

Allotments, too, have been the means whereby many women have helped in the production of food. During the War the acreage and numbers have more than doubled, the notable increase being in parish allotments, and in many instances they are, if not entirely, at least in part worked by the woman members of the family.

The result (usually sufficient vegetables for home use, and often surplus for sale or for distribution to local hospitals) has been to stimulate the desire for more knowledge. Instruction has been eagerly sought, and, as experience has proved that there is both pecuniary and physical benefit, many of the women are determined that on no account shall the allotment be given up after the War if it can be retained.

Of all forms of land work horticulture is by far the most popular with the majority of women, and it appears to be work for which they are particularly suited. Many of them already possess a considerable knowledge of the work and are am-

bitious to have their own holdings. The two difficulties which the greater number have to face are—

(1) Lack of sufficient capital to start on a big enough scale to make the venture profitable; and

(2) Want of experience in commercial methods.

Up to the present, unless a woman was fortunate enough to get a position in a good market garden there has been little opportunity for her to gain experience in commercial methods except by bitter experience.

This autumn the Governors of the Swanley Horticultural College have inaugurated a course in Commercial Horticulture, the results of which will be followed with close interest.

Although in the past Education Authorities were most anxious to get into direct touch with all classes of rural workers, it was often extraordinarily difficult to reach many of those who required and desired such instruction as would help them to make the best of their resources. The formation of Women's Institutes* ought to be of the greatest advantage to rural life. With the existence of an organised body it should be possible to arrange for such instruction as may be required, and no woman in the future should feel that she does not know where to go for information on any subject in which she requires direct instruction, or assistance.

THE WOMEN OF WALES AND AGRICULTURE.

MRS. M. SILYN ROBERTS,

Administrative Inspector, Women's Branch, Food Production Department.

AT the outbreak of War, it is likely that on an average there were as many, if not more, women doing agricultural work in Wales as in any part of the Kingdom. The reason for this is that Wales is a land of small holdings, which are mostly pastoral and which are run as family concerns.

Owing to the fact that there is but little co-operation in buying and selling, the farmer has to spend a considerable time away from his farm attending markets and fairs. This he can do without much loss to his farm, the women folk taking entire charge of milking and dairy work, and of the feeding of young stock.

Before the War, except in a few districts, the women rarely took part in field work as distinguished from stock work. The

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* See article at p. 827.

trend of public opinion was against it. Such forms of horse-work as ploughing are in many western districts considered highly improper, if not physically impossible, for women. In the 'fifties, 'sixties, and even 'seventies of last century, it was usual for women to work out in the fields, but as the cultivated land was laid down to grass or left to revert to rough pasture, the women field workers gradually dwindled in numbers, until, when War broke out, there were very few skilled ones left to teach and help the newly-recruited village gangs, and of the few who had been out working years ago it was not everyone who had the courage to admit that she was an expert from days gone by.

The gradual rebuilding of the supply of local casual labour has been interesting. In many places the enthusiasm for " war work " brought out many women, who at once found that the size of the gang had to be limited to the number that could be taught and supervised by the few " old hands "—the experts of long ago. In one village a group volunteered to go out with scythes to cut thistles, but they discovered that at the outset they would all have to go together, for there was only one amongst them who could sharpen a scythe. And so with every change of season, the new workers have had to be taught afresh. The number of willing workers has been splendid, but the skilled supervisors have been few in number, and often very shy and timid in the presence of their own pupils.

It is noticeable that in Wales many of the smaller hill farms are run entirely by the women, for even in peace time the men folk have other work, such as quarrying and mining. During the last two years the number of women entirely responsible for carrying on their holdings has greatly increased, owing to the men having joined the Forces, or having left home to work in coal mines, on railways, docks, etc. In one small valley in Carnarvonshire there are 47 such women farmers. In Cardiganshire, where there are many sea-faring folk, the number of women responsible for running their own small farms amounts to something like 500 for the county. In fact, around our coasts and in the hill quarrying districts, the number of small farms is remarkable. It may be that the precarious nature of mining and quarrying tends to make the women seek for something to help them carry on in time of need.

Since the outbreak of War, these little farms have proved reservoirs of labour, the members of the family being ready to help on the larger farms in the district. Many of our best Land Army recruits in North Wales have been of this type.

In several cases they have joined the Land Army not from their homes, but from the towns to which they had drifted, and where they were engaged in some other form of employment.

The farm maidservant is a very valuable class of worker who does a great deal on the farm, and the happiness of the farmhouse community, both in and out, depends very much on her. She is a skilled milker, and is entrusted with the care of pigs, poultry, and often calves.

A letter received from a Merionethshire woman, herself a skilled farm worker, tells its own tale, and shows how the War is gradually changing public opinion, even in the uplands and the isolated mountain districts of the western counties. This worker writes : " In my district no farmers keep maidservants —house-work is a secondary matter with them—dairy work and stock work take precedence. The wives and daughters are the milkers and stockmen ; it is seldom you find a man milking, or feeding calves or attending to pigs.

" One great effect of the War upon our women farmers is that while before the War they were not willing, especially the young girls who had had the privilege of attending intermediate schools, to admit or to talk of their actual work, such as cleaning out the byres, etc., now they take a pride in all that they do. I was in a farm a short time ago where two Land Army girls were employed, and the son said to me ' Why should such a fuss be made of Land Army girls ? My sister has always done the work they do, but she didn't like to say that she did it.' Once we get our young women to be publicly proud of their work on the land, it will be easier to persuade them to take up new methods of work.

" A girl of 20 years of age told me that she and her sister took charge of 9 milch cows, 19 calves from 10 to 15 months old, and 14 bullocks, made all their feed, etc.,—this was undertaken after the War broke out. The prejudice against women workers has been very great, but it has been overcome by the pluck, perseverence, endurance and good temper of our Land Army girls. I have known young men and women cycle miles in order to see for themselves Land Army girls at work."

A splendid lead was given in Monmouthshire by several of the large landowners. At a time when prejudice was strong they not only employed women themselves but undertook to train women for the county. Their action, undertaken when they themselves had to bear the expenditure, has borne good fruit. The number of L.A.A.S. women in Monmouthshire is

The experiment tried by Lord Treowen is particularly interesting. He undertook to staff Pwllyrhwyaid Farm with women, working under the direction of a man. Here the women were taught branches of farm work hitherto considered impossible for women. Ploughing, carting, every variety of field work, hedging and forestry—all this was done by girls drawn from town life and town occupations. The farmhouse, splendidly adapted for the purpose, with a bathroom added, served to teach the girls the true relations of hygiene to farm work.

In addition to this experiment, Monmouthshire owes four very successful training farms to Mrs. Williams of Llanrumney Hall, Lord Tredegar, Mr. Frederick Mills, and Colonel Curre respectively.

Undoubtedly the prejudice against women doing any useful work they can is dying down. The employment of women on tractors has largely contributed to this. Four have been employed in Breconshire, in spite of the hilly nature of the land; four have been employed continuously in Denbighshire since April; and seven tractor women are employed in Flintshire, and are doing very good work, having broken the record in the spring of this year.

In many parts of Montgomeryshire, Cardiganshire, Pembrokeshire and Monmouthshire numbers of farmers' daughters and others, who in peace time had a natural liking for horses, have taken up agricultural work with the farm horses, and are doing the loading, carting, harrowing, rolling, and, in some cases, ploughing, in real earnest. There are instances where women have shown a special aptitude for dealing with horses. In one South Wales county, (Breconshire) the War Agricultural Committee employ a woman as Assistant Horse Officer, and speak highly of her trustworthiness. They have now placed her in charge of the depot, which entails responsibility for the harness of 65 horses, and for the checking and giving out of stores, implements and fodder. This girl also keeps the record of the movements of the 65 horses belonging to the Committee working throughout the county. There are usually about 10 horses in the stables at the depot, and in addition to her other work, much of which is clerical, the girl, as Assistant Horse Officer, is responsible for the management of these horses. The soldiers and women whom the Committee employ at the depot take orders from her.

Townsfolk realised much earlier than the farming community the real danger of possible famine; the result was that there

were more recruits ready to help the farmers than farmers ready to accept the eager, but rather unskilled labour proffered. This energy was largely switched on to allotment work, and the holiday resorts of Wales, no less than the mining valleys and industrial towns, became busy horticultural centres. In one or two places it was the women who were the first to ask for allotments and to make the demand that all gardens should be fully cultivated. Here, again, teaching was needed, and demonstrations were organised in many different ways. The lecturers from the University Colleges at Aberystwyth and Bangor, and from the Farm School at Madryn and similar institutions, gave lectures and demonstrations. Women's Institutes had been already started in some places, and they did much to stimulate local food production in other places where allotment work had begun. The need of some means of co-operation became evident, and this led to the formation of additional institutes and other societies. Later, as the produce began to fill the gardens, the need of some means of distribution arose, and women's markets were formed, such as those at Criccieth,* Llanfairfechan, Welshpool and Llangollen—all differing slightly in details of management to meet local needs. Llangollen, one of the more recent ventures in marketing small produce, has developed a line of its own, inasmuch as it cooks its surplus and so finds a ready sale for the remainder of its goods in the form of supper and luncheon dishes, etc.

Out of these small beginnings of new corporate rural life already some few industries are developing. Several places have begun basket-making on a small scale, some making the more decorative baskets for home use, others the less beautiful but equally useful wisket for general farm and garden use.

From the outset, and especially during the first years of War, when it was beginning to be realised that women would be asked to lend a hand in agriculture as in many other branches of national work, the County Agricultural Organisers and others, who in pre-war days had struggled to make our nation realise the importance of agriculture before it was too late, came to the rescue with ready advice to the women as to how they could best help.

In many instances, before even the Land Army was inaugurated, some of the lecturers at the colleges had encouraged women who were eager to assist the farmers, and had given them instruction in the minor processes of field work. From the very

* See p. 841.

start a spirit of broad sympathy prevailed, and women quite unaccustomed to farm work were not afraid to appeal to the colleges for information.

There has been a general increase in the demand for instruction on many subjects connected with agriculture, chiefly at first from those who were new to agricultural work ; but the demand comes also from the younger women who have always been connected with farm work.

In the autumn of 1917, advantage was taken of the fact that for the moment the Farm School at Madryn was not needed for men students, and a short course was arranged for farmers' wives and daughters. This course was as follows :—

Agricultural Course for Daughters of Small Holders and Tenant Farmers.

The course consisted of lectures and practical work. The lectures dealt with the following subjects :—

1. Use and economy of manures.
2. Care and use of implements and machinery, together with practical work.
3. Construction of building, with special reference to ventilation and drainage. Its effect on labour. Its effect on health and welfare of stock.
4. (*a*) Dairy work. Milk and its products, and their market values.
   (*b*) Care, feeding and management of stock, with special reference to foodstuffs, rations, signs of health and disease. Common diseases. First aid to ailing animals.
5. Poultry, bee-keeping, gardening, with special reference to value of better strains and better seeds.
6. Labour-saving devices in the home.

Eight women attended the first course, and an immediate demand arose for a second course, which was attended by 12 women. Others wished to join, but there was no room for more, as by that time men students were in residence and structural limitations made it impossible to arrange for subsequent courses at Madryn.

Recently numbers of Merionethshire women have shown an eagerness to obtain training in general agriculture so that they may be able to meet the changes in agricultural work following on war conditions. Applications have been received, especially from the students of the courses outlined above, for information on the home making of cheeses and on other subjects. The agricultural education that Merioneth can give is negligible, in spite of the fact that its chief industry is agriculture, and more women are employed in agriculture than in any other work. Being a mountainous and sparsely-populated

pastoral county, its funds are all needed for its intermediate schools, and the amount available for agriculture is quite inadequate.

The University of Wales has always offered to women students exactly the same facilities as to men students, and in agriculture and forestry the principle holds good. A woman student of the University College, Bangor, has completed her degree in forestry, and has been engaged in important forestry work since war broke out, but unfortunately for our present needs, no woman has yet taken her degree in agriculture, though three women (also at Bangor University College) have pursued the diploma course in agriculture.

There is also a short course of 11 weeks in general agriculture held every autumn, but so far no woman has taken advantage of this, possibly through ignorance of the value of these facilities.

The dairy courses are better known—the course for students qualifying for the National Diploma in Dairying, and the short courses held at Llewenni and in the different counties. The Agricultural Instruction Committee are prepared to arrange extension lectures in agriculture and horticulture.

The University College of North Wales has a scheme of horticultural instruction which, since the outbreak of war, has been the means of turning out a most valuable batch of women gardeners. The scheme was made possible owing to the Marquis of Anglesey and Colonel The Hon. R. Stapleton-Cotton having placed their gardeners and gardens at the disposal of the College. The gardens are conducted on commercial market-garden lines, and the produce is sold. The training extends over a period of about 2 years, and includes a season's practical work in the gardens, followed by a 12-weeks' course at the University College and another season of practical work in the gardens, together with occasional lectures and demonstrations by the College and the Anglesey County staff. Pupils work under the direction of the head gardener, his foreman and assistants, and receive in return lodging and a weekly sum sufficient to cover the cost of living. Several of the students in training in the spring of this year carried off prizes at the competitive test in gardening at Rhuddlan. It is some indication of the business-like way they carried out their allotted tasks of double-digging, and pruning, that a head gardener who hitherto had stoutly refused to admit that women were any good, made application next day for two women, with the stipulation that he would like to have two of those he had

In Monmouthshire, also, it is interesting to see the complete fusion of interests between all bodies concerned with agricultural training. The Agricultural Institute at Usk is, so to speak, the pivot around which revolves all training work. The Institute allows its expert staff to test every trained girl and every skilled girl who expresses a desire to enter for a certificate.

No greater tribute can be paid to the work accomplished by the land girls in Monmouthshire than the giving over of a derelict farm by the Men's War Agricultural Committee to the Women's Committee to be worked by the Land Army.

The Nantyderry Training Centre for women market gardeners have prepared a special 4-weeks' course to meet the immediate needs of Monmouthshire war workers in the Land Army. The Monmouthshire Agricultural Education Committee give six annual scholarships towards the cost of 44-weeks' tuition at the centre.

Last year, when the Women's War Agricultural Committees were developing the allotment side of food production, courses of lectures and demonstrations were given at several villages. The Horticultural Lecturer from the University College, Bangor, demonstrated once a fortnight on one allotment in a district, and taught the women what should be done during the following fortnight. At the next visit he would inspect the fortnight's work, and show how to go on during the next fortnight. It was impossible for the hard-pressed staff to meet all the demands, but, fortunately, in many places head gardeners and other skilled gardeners gave invaluable assistance in a similar way.

Great help also was given where one person undertook to provide early plants and cultivate early seedlings under glass for her district.

Women have been employed in most sections of forestry work, in weeding, clearing ground for planting, and in nursery work. In the early part of the War several employers in Wales took on a number of women, and it has been interesting to notice the very diverse expectations of the different employers—from the man who wishes to make it as easy as possible for a woman war-worker to put in an energetic day's work and prove that she can undertake a man's job if the Nation needs it, to the man who has his unbending rules of labour discipline and maintains that if women are "any good" they must do the full 9½ hours work at high pressure, with only one break at

Much of this work could very well have been done in Wales by means of local labour, but for the first year or two local people looked somewhat askance at such work.

In 1915 and 1916 there were many places where labour for seed beds and nursery plots had to be imported. More or less educated women took up the work, and were joined after a while by a few local people, the numbers of the latter gradually increasing, so that there are now several instances in which the local labour is sufficient to meet the need, where originally labour had to be imported.

There is little need now to doubt the possibility of utilising woman labour successfully in most processes of forestry work. One large employer in North Wales writes :—

> "Women can do every kind of forestry work, except that I would not put them to tree-felling or heavy digging. They stand winter work quite as well as the average man. I have spoken to many young women engaged in planting during severe weather, and the general testimony has been 'I never felt better in my life.' On this point of enduring winter weather it should be remembered that war-workers in forestry have not been to any extent drawn from a class exposed to out-door labour. They have been shop-attendants, dressmakers, teachers, or domestic servants from towns. If the evidence is satisfactory in their case, how much more conclusive it would be with country-bred girls brought up in farm service. There will be plenty of chances for promotion for workers who attain proficiency and make a study of sylviculture."

This employer considers it advisable to have a female supervisor over every gang of 10 or 12, who should be sympathetic, and herself a competent worker. He was asked what he would consider good conditions for securing the best efforts of women workers, and he replied that he considered a week of 44-45 hours long enough, and that he thought,

1. Occasional breaks for rests were required.
2. Shelter places in case of heavy rain should be provided.
3. Warm clothing and water-tight boots were essential.
4. Payment by piece-work, with a minimum wage, advisable.

Employers often find it difficult to know what to do with women working in very exposed positions when the weather is unusually bad. Basket work, introduced by Colonel Sandbach, may be of interest to many. A group of Land Army girls was taught basket-making, and made a kind of wisket useful for farm work. These baskets were shown at the exhibitions held recently in North Wales, and dozens would have been sold

It is interesting to compare the returns of women land workers other than Land Army women, in May last, though the figures can only be used for rough comparison. The number of women willing to work, but unplaced, indicates that, as far as Wales is concerned, the women workers have very largely been absorbed. In Wales only 122 full-time workers are notified as unplaced, as compared with 2,987 in England. As regards unemployed part-time workers, Wales has notified 577, as compared with 13,998 for England.

It is a curious coincidence that the three counties with the highest number of women workers are the three counties farthest west—Cornwall, Pembrokeshire and Carnarvonshire.

Since the War, the developments in women's agricultural work in Wales have taken the form of increased activities on the part of the native rural community, though the Land Army has been an invaluable incentive in many ways. The very existence of the Land Army—with its enthusiastic view of the national importance of land work—is a continual reminder that farm work is "war work," and, therefore, all connected with it must give of their best.

The Land Army girl, too, has undertaken to do whatever job is given her to do—no matter what the dictates of custom or fashion. She has, therefore, been the means of speeding up the process by which local women workers take up jobs hitherto done only by men.

In the sudden rush of harvest work, the Land Army has been invaluable in isolated districts and in places where the organisation of local workers has not been developed fast enough to meet the sudden increase of harvest work which this season has produced. The fact remains, however, that Wales possesses on its small farms a reservoir of labour, both for the larger farms and for the busy seasons of afforestation work.

The War has shown not only that women can take their share of this out-door work, but that they themselves are happier and healthier in consequence.

WOMEN'S INSTITUTES.

MISS GRACE HADOW,

Vice-Chairman, National Federation of Women's Institutes.

VILLAGE meetings for social intercourse and the interchange of ideas upon subjects such as poultry-keeping or jam-making would seem at first sight to be as little related to warfare as anything well could be. The connection between mending a kettle-lid with a button or turning stocking-tops into children's vests and the upheaval of a world catastrophe is not obvious, and yet to those who appreciate the full meaning and possibilities of women's institutes there is something peculiarly appropriate in the fact that they made their first appearance in England during the War. The institute movement stands for something far deeper and finer than the mere amenities of life—though these are by no means to be despised—for something of greater extent than even war economies, though these have served, and are serving, many useful purposes apart from the conservation of the food supply or the reduction of imports. It is a product of the age, a product whose roots strike far below the superficial needs of the moment, and the best guarantee of its permanency lies in its close kinship to other movements, in the fact that it moves with the great flood tide of public opinion.

All this seems grandiose when applied to so simple a matter, and would be worse than untrue, would be ridiculous, if women's institutes were, as has been sometimes unkindly suggested, no more than glorified mothers' meetings. Mothers' meetings are admirable institutions where some kindly lady gathers together her poorer neighbours and gives them good advice tempered by tea. Without doubt they often afford an opportunity for sorely needed relaxation and foster a spirit of friendliness; without doubt the advice given is often really wise and useful—but the whole thing is done for the mothers: it is an entertainment provided by one class for another. The essence of women's institutes is their apostolic democracy. Old barriers have fallen, new friendships have been born of the opportunity for common work and common understanding, and this new and noble democracy of service and of mutual help finds expression in the very homeliness of the institute ideal.

The women's institute is for all alike: rich and poor, gentle and simple, learned and unlearned—all pay the same subscription, have the same privileges and the same responsibilities.

Each member in turn acts as hostess to her fellow-members; each puts her own experience and her own practical knowledge at the service of the rest. "I've come to every institute meeting this last year," a member was heard to remark, "and I ain't felt I've been patronised yet." That is one side of the institute movement, and to anyone at all intimately acquainted with English village life it will not seem a slight or an unimportant one. In the days that are to come, in the difficult time of reconstruction, it will be much if throughout rural England women have learned to trust each other and to work together.

There is, however, another no less far-reaching power in the movement. Country women, scattered, remote, hard-worked, up long before dawn to get breakfast for a man who must go perhaps eight or ten miles to his work, with children to get to school, and often poultry and pigs to tend in addition to housework, have little time to read the papers, and little chance of coming into contact with the world outside. City-dwellers have a thousand opportunities of picking up scraps of information—however erroneous—but the country woman knows none of these; she is spared the jostling of the crowd, but she loses also the chance hearing of this and of that. Institute meetings provide just the opportunity and the stimulus she requires. There is nothing terrifying about them. She comes to meet a number of her neighbours once a month, or it may be oftener. They discuss the present difficulties of housekeeping: she tells them how she makes her sugar last, and someone else tells how to save fuel; there is a simple lecture on the best way to feed chickens in present circumstances, and then Miss X. plays and Mr. Y. sings, and the hostesses for the day provide a cup of tea and a bun all round, and the members go home feeling friendly and cheered, and that they have learned some practical method of war economy, or of making something useful for the children or the husband. Bit by bit other topics are introduced. Controversial subjects, religious or political, are taboo, but interest in their own homes leads naturally and inevitably to interest in questions of housing, sanitation, infant welfare, and kindred topics. The members learn to realise their responsibility towards the community in which they live, and, from an interest in their own village and their own county, come to see the connection between their affairs and those of the nation at large. It would be difficult to plan a better training for the exercise of the vote—a training entirely divorced from all party or

sectarian politics, based on the actual experience of home life and home needs, and working outwards through a sense of responsibility educated not to take but to give. Without the War it might have been difficult to induce women of all classes to meet together to give each other their most cherished household "tips," but war has made this seem natural and simple—as indeed it is—and the spirit which it implies goes far beyond the mere details of cooking and mending: it is the basis of true citizenship.

A spirit of true democracy and a sense of corporate responsibility are no small things to foster, but the women's institute movement not only encourages these more general and abstract qualities, but it has a practical value with regard to certain very definite needs of the moment and of the immediate future.

1. The Women's Institute Adds to the Attractiveness of Village Life.— Before the War low wages, long hours, isolated lives, and little amusement, were rapidly emptying the countryside of young people: boys and girls were drifting off to the cities; cottages were falling into ruin. "Back to the land" has long been a familiar cry, but it is no use telling people to go back to a place where they know by experience they will be bored: if country life is to attract it must be made attractive. The Y.M.C.A. is making much of the need of our men for village institutes after the War: the need of our women is no less, and it is useless to provide for one sex and ignore the other. If village women are given opportunities for social enjoyment, and are encouraged to take an intelligent interest in bettering the conditions in which they live, one great step will have been taken towards the revival of village life.

2. The Women's Institute Stimulates Village Industries, thus at once affording increased opportunities for earning, supplying certain definite needs, and establishing industries which may prove of great benefit to crippled men after the War.

The Northamptonshire institutes are taking up toy-making and basket-making, both of great importance at the moment. At Bingham eight members are earning *22s.* a week by making "half-sieves," and the waste ends are used as fuel. In Sussex fourteen, and in Hampshire eight institutes are making soft toys, and as the result of exhibits shown at the British Industries Fair the East Sussex Toy Industry received orders to the value of over £300. So widely has this industry spread that a special Toy Industry Sub-Committee was formed in the spring of 1918, and a trading society under the Industrial and Provident Societies Act is in process of formation.

At Criccieth Women's Institute co-operative production and marketing have been established with such success that between March, 1917, and February, 1918, there was a turnover of over £2,000. In Worcestershire the institutes are co-operating with the County Market Scheme, which, within five weeks, increased its weekly turnover from £150 to £1,000. At Chelmsford a most successful co-operative Women's Institute market stall is held, while at Chobham a similar venture provides local requirements with local produce, whereas formerly most of the imported vegetables were obtained from Covent Garden.

At Haywards Heath a weekly market is held by five local institutes, which contribute fruit, honey, flowers, cheese, live chickens and rabbits, bottled fruit, jam, toys, vegetables, and needlework, and the women are very pleased with the prices they get for their produce.

Other institutes have started rabbit-breeding, goat-keeping, and pig-keeping, the co-operative purchase of feeding stuffs in these cases making for both economy and good quality.

3. The Women's Institute Encourages War Economy.—Cobbling, rug-making, and starch-making from diseased potatoes, are among some of the industries which will probably be temporary, but which are being successfully carried on now. In one district where there was a number of small fruit growers the president lent her kitchen and pans, the institute bought fruit at current prices from all who cared to bring it, a concession as to sugar was obtained from the Ministry of Food, jars were begged from the neighbourhood, and by August this year 2,700 *lb.* of jam had been made and sold first to inst tute members (who were entitled to 6 lb. a head) and then to the general public. The fruit would not have been worth collecting and sending to a distant jam factory, and but for the institute would either have been wasted or consumed raw instead of being preserved.

Another institute has an upholstery class; others have started co-operative village laundries and communal kitchens; while still others have started or revived cheese-making.

These are only some of the activities which have been fostered by the movement. The fact that it meets a genuine need is best proved by the history of its development.

Origin of Women's Institutes in the United Kingdom.—In 1913 Mrs. Alfred Watt, M.A., Secretary of the Women's Institutes Advisory Committee to the British Columbia Department of Agriculture, came to England. She spoke on Canadian Women's Institutes at different gatherings, and shortly after war broke

FIG. 15.—A Tinkering Class at a Women's Institute.

FIG. 16.—A Cobbling Class at a Women's Institute.

out issued a leaflet showing how the establishment of women's institutes in villages would help towards an increased food supply. In 1915 Mrs. Watt, who had for many years been connected with the women's institutes of British Columbia, discussed the matter with Mr. Nugent Harris, then General Secretary of the Agricultural Organisation Society, and after further investigation and reports the A.O.S., at its annual meeting on 23rd June, 1915, passed the following resolution:—

"That this meeting is of the opinion that the Women's Institutes movement, which is filling so important a part in the rural life of Canada, could be adapted and made equally suitable to English rural conditions, and that the body to organise it in this country is the Agricultural Organisation Society, and that it be a recommendation from this meeting to the Governors of the Society that they should be responsible for the work."

This resolution was approved by the Governors, who appointed a small sub-committee to carry out the work.

The first districts visited by Mrs. Watt were North Wales, where the first institute was formed at Llanfairpwll in September, 1915, and East Dorset, where the first English institute was formed at Wallisdown in November of the same year.

By December, 1916, 50 institutes were in existence, and the number increased steadily. By October, 1917, there were 137 institutes in England and Wales, and the importance of the work they were doing with respect to increasing and preserving the food supply had become so evident that the Board of Agriculture, with the approval of the A.O.S., offered to assist in their formation by creating a special Women's Institute Section under the Women's Branch of the Food Production Department to undertake propaganda in close co-operation with the Women's County War Agricultural Committees. Representatives of all existing institutes were summoned to a general meeting in London, and they (*a*) decided to accept the offer of the Board, and to transfer to them all work in connection with the formation of new institutes; and (*b*) elected an Executive Committee to continue and develop the work hitherto carried on by the A.O.S., of assisting and strengthening existing institutes. The Executive consisted of the Lady Denman, Assistant Director of the Women's Branch of the Food Production Department of the Board of Agriculture; representative members of various institutes; four members nominated by the A.O.S.; two members nominated by the Board of Agriculture (Women's

Branch), two by the Board of Education, and one by the National Union of Women Workers—Mrs. Watt as Chief Outside Organiser, and Mrs. Harris as Head of the W.I. Section attending *ex officio*.

So rapid was the growth of the institutes and so vigorous was the desire to co-operate and to break new ground, that it soon became advisable to strengthen the organisation by forming federations to link together the institutes in each county and to assist in the establishment of co-operative industries. At the present time (October, 1918) there are 700 Institutes in England and Wales, and 18 County Federations—including the North Wales Union.

Nor has the movement been confined to England and Wales. In the spring of 1916 Mrs. Blair of Hoprigg Mains, Gladsmuir, and Mrs. Gooch of Torcastle, Banavie (who had seen something of the working of institutes in England) independently approached the Scottish Board of Agriculture to ask whether they would give favourable consideration to the formation of women's institutes. Moreover, in April, 1917 (at the suggestion of Mrs. Blair), the Scottish Council of Agriculture passed a resolution that women's institutes on the lines of those in England should be established.

A deputation to the Secretary for Scotland was favourably received, and Mrs. Watt was invited to address public meetings organised in the north of Scotland by Mrs. Gooch, and in the south by Mrs. Blair. An Advisory Committee to the Board of Agriculture for Scotland was set up, and they appointed Miss A Campbell as Organiser for the period of two years. By August, 1918, 35 institutes had been formed, with a membership of 1,391.

In Ireland, the work done by the United Irishwomen on similar lines is bearing excellent fruit. The aim of this association, which was started in 1910, " is to raise the standard of health and living, and to press into the service of their country all classes and all sects among women whose homes and interests lie outside the township areas. Such women have often felt that their talents are somewhat wasted and their opportunities of assisting in public work have been too few to be worth considering. The 'United Irishwomen' offers all women an opportunity to assist in the regeneration of their country at a time when the assistance of every man and woman is required as it has never been wanted before." The aim of the Women's Institutes movement is precisely the same, and

When it is considered that women's institutes have come into existence at a time when everybody was already more than fully occupied with other affairs, when difficulties of transit placed almost insuperable obstacles in the way of holding meetings, and difficulties of food made a somewhat dismal solemnity of social functions, when money was so easily—and rightly—raised for war charities that it was almost impossible to raise it for anything else, and when most of the women who would naturally have been the leaders or organisers of such a movement were absent from home nursing in hospitals or driving motor ambulances in France, the rapidity of its growth and the fact of its becoming so widespread speak much both for its vitality and for its suitability. In war-time we cannot do with superfluous calls upon our energy; time becomes a thing to use, not to pass, and that a large and ever-increasing number of shrewd country-women choose to use it in this way shows that they find the institutes of practical value. Nor have they a value for women only: one sex cannot benefit without its reacting on the other, and the whole of rural life must necessarily be affected by such a movement. In the words of Sir Daniel Hall, Permanent Secretary to the Board of Agriculture and Fisheries, in a circular, dated May, 1918, addressed to the Local Education Authorities in England and Wales :—

> "Of the many new enterprises in rural development which the War has stimulated, there are few, in Mr. Prothero's opinion, which are so full of promise for the future as the active association of women with agriculture and the prominent share which they have taken in the food production campaign. Women's Institutes, where established, should provide a means of preserving the new spirit, as well as of extending it in fresh directions; but it is as a potential stimulus to the education of the men and boys engaged in agriculture, as well as of the women and girls, that Mr. Prothero thinks they particularly deserve the support and sympathy of Education Authorities."

The new spirit to which he refers is one which bids fair to set agriculture in its proper place as the true aristocrat of industry: "We may talke what we please of Lilies and Lions Rampant, and Spread Eagles in Fields d'Or or d'Argent; but if Heraldry were guided by Reason, a Plough in a Field Arable would be the most Noble and Antient Armes," and these arms the promoters of the movement look to see borne in triumph

A WOMAN'S FARM IN DEVON.

MISS SYLVIA CALMADY HAMLYN,

Hon. County Organising Secretary for Devonshire, Women's Branch, Food Production Department.

The Farm Itself.—Forty years ago Great Bidlake Farm was well known throughout the district as a wheat-growing farm. When it no longer paid to grow wheat the Great Bidlake land, together with much more in western Devon, fell out of cultivation into pasture varying considerably in value.

For the farmers living in these upland farms that fringe the northern slopes of Dartmoor stock rearing became the end in view, and extra accommodation for store cattle was eagerly sought after right up to the time of the Corn Production Act.

Once the house of the manor farm of the Bidlakes, an old Cavalier family now extinct, was for a time used as a farmhouse. Later it became separated from the land, which was let annually as grass accommodation land. This system of grass sales so popular in Devon, and more particularly in western Devon, where the smallness of the holdings makes it imperative for the successful stock rearer and fattener to find a larger range for his stock for the summer months, usually resulted in the exhausting of pastures by as many animals as possible being grazed on them annually from May to December, with little or no return in the shape of manures.

This system has been pursued at Great Bidlake for many years, and the grass sale was always a popular fixture, and the history and possibilities of each field as pasture were thoroughly well known to every neighbouring farmer.

It was a common saying at each successive grass sale that " time was when Bidlake was a proper wheat farm," much as it might have been suggested that once wooden ploughs were used there, so much had corn growing ceased to be considered practical politics in the district.

The farm lies high in a high country—about 700 ft. above sea level, facing on its southern side the northern heights of Dartmoor and on its northern side the 30 odd miles of wind-swept country that lie between it and the Atlantic. Very high and very exposed, in a tract of country which is open to all the incoming wind from the sea, a wind which is caught by the Moor and flung back upon its track, the farm bears its full share of the Dartmoor storms. Away to the west is the range of the Cornish hills, Brown Willy and Rough Tor, and the china clay

heaps of Roche can be seen gleaming in the sunshine. The view is a wide and fine one, and the road from Land's End to London cuts the bottom of the farm land.

When the Devon Women's War Agricultural Committee, encouraged by the Women's Branch of the Board of Agriculture, approached the Devon Men's Executive (Food Production Department) with a view to obtaining an experimental farm for women's labour, one or two alternatives were suggested. It was felt, however, that Great Bidlake had several advantages, notably the compactness of the holding and the reputation for its possibilities of arable cultivation.

On 28th October, 1917, 144 acres were taken over under the Defence of the Realm Act and the whole handed over to the Devon Women's War Agricultural Committee for cultivation by woman labour.

At that time there were no buildings available, nor any tool or implement of any description upon the farm. By arrangement with the occupier of the Manor House the necessary farm and outbuildings were obtained and taken over by the Men's Executive. These comprised a good 4-stall stable and harness room, a cowshed, large for the district, with standing for at least 12 cows, a root house, two calving boxes, a big loft overhead, and a rickyard. In addition there are two rough implement sheds, " linhays," in an adjoining yard.

Water is laid on in each field, and the River " Lew " runs through the bottom marshes. The farm may be divided into approximately about 30 acres of really good pasture, 30 acres of marshland bottoms by the river, and the remainder arable land of good, bad, and indifferent quality.

Work on the Farm.—The banks were overgrown, and riddled with rabbit holes, and thistles had a firm hold in almost all the fields. The quota laid on the farm by the Western Food Production Department Executive was 45 acres, and, since time was short, a soldier ploughman was sent down on 1st November to start the ploughing of the wheatland. He proved quite unsuccessful, and in his place two local teams were engaged to plough 20 acres for wheat. This was done, and done well, with the local Huxtable one-way plough. An unskilled soldier, aged 18, helped until 30th December with the heaviest ploughing, and thereafter no male labour has been employed on the farm.

On 4th November the four girls sanctioned as the staff arrived, chosen from the Land Army girls available in

The first work undertaken was the cutting of the hedge wood most liable to interfere with the arable cultivation, no light task where the hard wood was frequently 20 ft. in height. Both axe and cross-cut saw were used, and the banks made up and layered. For the first week an axe and some hooks were the sole implements upon the farm.

It became clear that the girls would not be able to get through all the ploughing with the hand plough, and it was decided to try, despite every opposition, an American Sulky plough. The Syracuse Company's agent brought one on trial to the farm and quickly proved its suitability for woman labour. From that day the ploughing presented no difficulty, and much of the stiffest land has been ploughed to a depth of 7 in. by a public schoolgirl of 19.

Four horses were allowed for the farm—a team, an old mare, and a half-cart cob. The team would and did plough $1\frac{1}{2}$ acres a day at their best in the Syracuse riding plough. The discovery of this plough made it possible, instead of attaining with difficulty the required 45 acres of the quota, to plough 82 acres for wheat, oats, mangolds, and potatoes.

It must be borne in mind that all the land was ploughed down from grass, and was in a sour, tough condition, and particularly difficult to deal with. Three of the fields were very steep, and in fact the field put into potatoes was thought by many who saw it to be out of the question for ploughing with the Syracuse Sulky plough. This field was very sour indeed, and was full of stones and small boulders, with a furze brake in one corner: of late years it had only realised from 5*s.* to 10*s.* an acre, let from May to December. It was found necessary to follow the riding plough and not ride it in the steepest part of this field.

Crops Grown.—Two fields were put into Red Standard wheat (locally grown seed) early in November, and one into Red Joss seed sent by the Food Production Department, all without manuring. Throughout the cultivation a great deal of trouble was taken with the tilth, the fields being dragged and rolled again and again by the girls.

The rolling was first of all done by the granite roller typical of the district, weighing half a ton, and very hard to turn without disturbing the rolled surface. This was about as heavy and unwieldy an implement as could have been given to girls to use. Later the Department sent a cylinder roller and a Cambridge roller, both of which were much appreciated, and helped to change local opinion as to their worth. When

they arrived at Bridestowe Station many criticisms were made as to the wrong-headedness of a Department which could send such things into the district. Before long, however, these criticisms were retracted, and there were many who would gladly have been in possession of the rollers that proved better in working than the old "granites." At one time it seemed probable that the wheat would be a minus crop, but a dressing of sulphate of ammonia saved the situation, and a steady growth was made, resulting in a crop strong in straw and good for the district, harvested in September.

Some 32 acres were put into oats, the seed used being Black Tartarian from the corn-growing district near Yeoford, Devon, and an unnamed black oat, the seed of which was imported from New Zealand, and grown once on the high cliff-land near Wadebridge, North Cornwall. This was particularly fine seed, and made a remarkably good growth, very stiff in the straw, with a heavy grain. All the corn crops stood well, in spite of very heavy rains.

Mangolds were tilled in a steep 8-acre field, rather shallow in soil and stony, and proved to be the best crop in the district. The varieties sown were Yellow Globe and Yellow and Red Intermediate, and a compound chemical manure sold by the Western Counties Association was used.

Nine acres of potatoes were put in, in the worst and steepest field, and were twice sprayed by the girls with knapsack sprayers, since the horse sprayer sent by the Department would not work on the gradient. This very heavy job the girls performed with the greatest willingness. The potato crop was not a heavy one, but was an average for the district, being about 8 tons to the acre. The best of the pastures were dressed with basic slag in the bottoms, and superphosphate on the higher land to the amount allowed by the Men's Executive, and 20 acres were saved for hay. There was, of course, a complete absence of any farmyard manure for dressing purposes.

Care of Stock.—A special point was made of the care of the horses, since it is often argued that girls cannot well be successful in the handling of heavy cart teams.

The horses purchased were bought with a view to hard and constant work rather than for their suitability for woman labour, and were a complete success. The team consisted of a 17.1 hands gelding, 7 off, which came with the reputation of being too hot for his former master, but a fine worker, and of a typical

worker, perfectly good-tempered, but not over eager. These horses have been responsible for the greater share of all the farm work. The third, an aged cart mare for the slow carting work, and the fourth, a half cart cob, 4 off, to run in the milk float and do extra horse in the binder or elsewhere, completed the quota of horses.

Since it was decided to use the farm as a training centre, an aged Food Production Department mare has been added for the pupils to practise on.

Twelve dairy cows were purchased, Shorthorns, Devons, and three Guernseys, and the milk has been sent daily to Plymouth.

Staff.—The staff of four girls sanctioned for the work consisted of a forewoman, a horsewoman, and two for milking and general work.

The first forewoman was an educated woman who had lived in Devon at her own home previous to the War. The first horsewoman was a public school girl of 19 who had a natural aptitude for horses, and who was responsible for the greater part of the ploughing.

These two left when it was decided to train Land Army girls on the farm, and were replaced by the original third hand as forewoman and by a girl of 18 fresh from school. This girl, the daughter of a well-known North Devon cattle dealer, had some practical experience, and quickly proved her skill with horses, both in conditioning and working them. Later she cut all the corn with an Albion self-binder without any difficulty, though both she and her horses were new to the job. The fourth member of the staff is a girl of 17½ who has done 1½ year's forestry on the Duke of Bedford's estate, and who possesses unusual physique and power of work. Both the third and fourth staff girls are of the industrial class. The present forewoman, a solicitor's daughter, had never been out of a town previous to volunteering for the Land Army for the duration of the War.

Since June ten Land Army girls have been taken for the usual six weeks' training arranged by the Women's Branch, and have been useful as extra hands for weeding and in the harvest, though probably most practical farmers would not care for a constant succession of new and quite unskilled hands, however willing.

General.—In reviewing the work from a practical standpoint it may be granted that it is a matter of no little surprise that so much work of the hardest kind could be accomplished by

unskilled girls, and it is strong proof that the will to work, and a fine standard of selfless devotion to the work as such, can go far to help food production.

The aim throughout has been to carry on the work on ordinary practical lines, and although it is too early a date to make an accurate statement, there seems no reason why the balance sheet should not prove to be quite satisfactory.

It is noteworthy that on all the newly-broken land the crops have been perfectly healthy, and free from the many pests that it was prophesied would destroy them.

The present condition of the farm has the approval of all the neighbouring farmers and of many farmer visitors, who are delightfully generous in their praise, and it seems strange now to look back upon the days, not so very far behind, when it was said that " they women would do more harm than all the weeds in the parish." Agriculturists would realise that more has been accomplished than the mere ploughing of the additional acreage if they heard farmers at the local markets telling each other that " they women have done well."

If Great Bidlake Farm should prove another milestone on the road that leads away from prejudice to a wider vision, the women who have worked bravely through storm and sunshine will not have worked in vain.

Women's Work on the Land.

Farmer's Tribute.—The best evidence possible that the Women's Land Army is proving enormously useful is offered by two facts—(1) that the demand for their labour at present greatly exceeds the supply, and (2) that the farmers employing women are practically unanimous in their praise.

So large is the present demand for women for potato lifting and similar work that it has been necessary to withdraw a number of women temporarily from the training centres and to arrange for them to finish their training later on. Big gangs of women are wanted for potato lifting in all the three divisions of Lincolnshire, in Shropshire, and Cheshire. Harvesting gangs of women have been asked for in the East Riding of Yorkshire and a women's threshing scheme has been arranged for the West Riding.

Among recent testimonials to the land women may be quoted the following tributes by farmers in Kent and Buckinghamshire respectively :—

> " These girls have worked excellently, have proved themselves worthy of the name of Britons, and have done credit to the Women's Land Army. I trust you will express my feelings and thanks to the girls and also make it known to their fellow workers at the earliest possible chance when there is a body met together. To make this public will give me the greatest satisfaction."

> "Can you put into the right channel my sincere thanks for the great help we have received from two of your tractor army women. I thoroughly appreciate the help they gave us in cutting our corn this season and enabling us to get the same in record time and in fine condition. I am afraid some of our Bucks farmers do not realise the great sacrifices some of these girls are making in helping us . . . I am pleased to say these two girls are coming this week to plough and cultivate some 60 acres."

A Devonshire farmer also writes saying that he regrets that he did not apply earlier for women and, in future, will be pleased to recommend the Land Army girls to his fellow farmers.

A Woman Milk Inspector.—A member of the Women's Land Army has been appointed milk-weighing inspector in Wiltshire by the Farmers' Association. Her duty includes touring the farms and inspecting the weight register to see that it is kept up-to-date.

Women Thistle Cutters.—Useful work in thistle-cutting has been done this season by women. Two of them in Denbighshire have cut 254 acres, of which 51 acres were cut in 8 days.

Women Hedgers.—According to the Women's Branch of the Food Production Department demands are beginning to come in for women to undertake hedging work during the winter months, and trainings in this work for women are being arranged in various parts of the country.

Women Threshers.—The scheme for the employment of women threshers has been fairly started, and gangs of women are now employed in Kent, Essex, Warwick, Stafford, Yorkshire, Glamorgan, and other counties. The girls appear to be keen on their new job. They are housed in permanent billets and go out to their work every day. The gangs consist as a rule of four Land Army women and a forewoman; and wages average 23*s*. per week.

The experiment of employing women for this work was tried for the first time in the autumn of last year, when gangs were sent out to Lancashire, Leicester, and Nottinghamshire, where they did good work.

That the work is of an arduous nature, and trying in many ways, is not to be denied, and only the strongest women are chosen for it. Moreover, the most careful supervision is given to the women employed on threshing. Some of the women have improvised masks of muslin or light canvas and say that they find these entirely successful as a protection from dust and smoke.

A Women's Pig Club.—Madron Women's Institute has a pig club which is a great success, although conducted under difficulties. About 60 shares have been allotted. The sty is a disused dog kennel in a plantation, and two members take it in turns to feed the pigs (one week each). They have five shares apiece, and the offal of the pigs in return for their services. Girl guides and other children collect the food without reward. They have a barrel on wheels with shafts for its conveyance. The carpenter who made this for them refused payment. The pigs are to be killed by the husband of one of the members and sold by another member's husband.

A Useful Women's Institute.—Doddington Women's Institute holds a weekly meeting for the cleaning of sphagnum moss, which is collected by members and school children. Sacks of moss and dressings are sent to the hospitals. Bottled fruit is also given to hospitals. A market-garden produce show was held lately and the exhibits sent

to the Navy. Northumberland Prisoner of War Fund has also been helped. Waste paper and wool are collected by the Institute, which has a library of 127 volumes.

Co-operative Tomato Growing.—Church Oakley Women's Institute bought tomato, celery and leek seeds and seedlings co-operatively. The vice-president, who made herself responsible for the seedlings, traced 160 fruiting plants to one sixpenny packet of tomato seeds. Three pounds of ripe tomatoes were taken in one day from a plant, and the Institute has bottled 60 lb. of tomatoes and made 4 quarts of tomato sauce.

Two Women's Markets.—Ipsdon Women's Institute opened a market stall in January. Since then £24 5s. 10*d*. has been taken, a creditable amount when the size of the village is considered. All sorts of garden produce, garments both old and new, and odds and ends of all descriptions find ready purchasers. Some of the members contribute the money taken for their goods to the Sisterhood Guild, which gives a kindly helping hand to women in need. Fifty-four garments had, up to recently, been made and distributed. This Institute has a live-stock club.

The Criccieth Women's Institute market, which was registered on 24th March, 1917, reports a turnover since then of upwards of £2,000. Vegetables, fruit, poultry, rabbits, and eggs are sold in the market. The local women are responsible for the whol of the management of this interesting development at the Prime Minister's village.

THE FOOD PRODUCTION PROGRAMME FOR 1919.

THE following is a Memorandum of a speech recently made by the Director-General of Food Production to Chairmen of Agricultural Executive Committees:—

I propose to devote some remarks to the more detailed policy of breaking up and improving cultivation, and to make some practical suggestions which the County Chairmen may like to have circulated to your Central and District Committees and to the Executive Officers.

The details may be of especial use to those who will make the actual surveys:—

The Surveyor should *not refrain* from scheduling land as suitable for tillage on the ground that the scheduling may involve some *risk of loss* to the occupier. The law provides for compensation being paid to the farmer who can prove that the needs of the nation have involved him in material personal loss.

During the continuance of War the most important agricultural products are—

(1) Bread corn; (2) potatoes; (3) milk.

Next in order come—

(4) Bacon; (5) beef; (6) mutton.

Because of the fine harvests both in Western Europe and in the United States the immediate outlook for the bread supply is not actually in a precarious condition, but the Allies generally will need to draw very heavily on North America, and every ton that has to be brought to England, France, and Itàly, reduces the effective strength of the American Army in Europe.

The large United States maize harvest of 1917 has resulted in a production of pig meat in the United States which will *supply* this country with *all the bacon and ham* required for *some months* to come. On the other hand it is likely that supplies of *beef* and *mutton* will be *deficient* in the *spring* months. But the policy of Officers of Executive Committees must not be guided by the outlook of the moment; they are preparing for the harvests of 1919 and 1920, and before these harvests have been gathered, the food position may have undergone important changes.

The *policy* of the Food Production Department is essentially an *insurance policy*. The task is to guard against calamity, not to provide for minor shortages which may be disagreeable but do not seriously lower the vitality of the nation. We have now got to consider seriously the harvest of 1919.

Breadstuffs.—The position for the cereal year 1918-19 is better than it was in 1917-18, as far as our own production is concerned, but it cannot be too clearly realised that the comparatively satisfactory position of the present year is due to a *combination* of great effort and *good weather* in many allied countries. *Given a bad harvest* in *North America* the *cereal* position might *become critical*.

The whole success of our present system of food supply would be endangered if there were such a shortage of breadstuffs as would make bread rationing necessary.

The prime object of the Food Production Executives must be to produce as large a quantity of bread corn within the conntry as possible.

Potatoes.—*Up to the limit* of the present acreage, potatoes will be required to ensure an adequate supply for ordinary use. If the acreage is increased, or if there is an over-average crop, a considerable quantity can be absorbed in bread-making. Potatoes produce nearly twice as much food per acre as cereals; but the labour bill is heavy, and the risk from disease considerable: on the whole, therefore, an increase in the present acreage is less desirable than an increase in cereals, and Committees *should not press for potatoes in place of cc* [illegible] ditions that distinctly favour potato grov

Milk.—Efforts are necessary to maintain the present production of milk; but in dealing with the land of dairy farmers, Officers of Committees should remember that winter milk is of much greater value to the nation than summer milk. If a dairy farmer produces little or no milk during winter, his produce is of less importance than bread corn from the standpoint of security.

Pork and Bacon.—For the present, ample supplies of bacon are being obtained from America, and it appears likely that the American export will continue, but as a deficiency in pork and bacon would be worse than a deficiency in beef and mutton, since fat meat is more needed than lean meat, it would be unwise to reduce our present very limited production, and Executive Committees should endeavour to secure an increase in pig-keeping to the utmost limit permitted by the food available, especially on farms where potatoes are grown.

Beef and Mutton.—The stocks of animals suitable for slaughter fell very low last spring, and though an improvement has taken place, it is likely that the supply of beef and mutton for civilian use will be further restricted. It would, however, appear probable that, with reasonably good management, the present number of cattle could be maintained, and a supply of meat sufficient for essential civilian needs could be produced for some years. As meat is a food always in keen demand when money is plentiful, the supply will not meet the demand; but it must be remembered that the production of beef and mutton requires much more land than the production of breadstuffs.

In scheduling grass land *for corn growing* there is no statement that the surveyor will come up against oftener next season than that it is unwise to destroy grass when meat is scarce in order to grow grain of which there is plenty. The answer is that late in the cereal year the country seldom has more than 10-15 weeks' stock of grain, and that no one can foretell what quantity we may be able to secure in future, while as regards meat we have within the country stocks of cattle and sheep which can in emergency provide sufficient rations for the population for two or three years at least.

Grass of average quality also produces much less *meat* than does the same area of average plough land.

It is, of course, most desirable from the nation's as well as from the farmer's standpoint that the *stocks of cattle should be maintained*. We must utilise to the full the very large areas of grass land that will in any case remain even after full provision

has been made for the dairy herd and for horses; we must have animals that can make profitable use of straw, and we must provide manure for arable land.

The *shortage* of *feeding stuffs* for cattle will give rise to difficulties in scheduling grass land, and any grass on which a *bullock will fatten* will have a special value. Fine feeding *pastures* on which cattle may be *fattened without oilcakes* should not be broken up.

On the other hand, after the best pastures are excluded, there will remain grass of good quality, which, with the aid of feeding stuffs (now unprocurable), might fatten cattle; and without feeding stuffs would make " fresh stores "; and there is *no land likely* to be of more value for tillage purposes than this class. As in the case of dairy cows, it is winter not summer " keep " that is most necessary. There is an abundance of grass suitable for making good " stores "; the practical difficulty will be to maintain the condition of forward stores on the winter foods now available. Scarcity of meat will arise not at the end of the grass season, but between February and May, and the surveyor should, therefore, freely *schedule grass* which *does not reach* the standard of a *fattening pasture.*

The Land and Crops of England and Wales: Land Available.—There are about 27,000,000 acres of land under crops and grass in England and Wales, in addition to about 4,000,000 acres of mountain and heath used for grazing. Of the cultivated area 12,400,000 acres are under arable cultivation and 14,600,000 under permanent grass. Including temporary grass, clovers, sainfoin, and lucerne, about 16,724,000 acres are available for grazing, or for hay, and *only 10,264,000*, or one-third, are tilled for grain, potatoes, and other crops.

In the present year we have less than 57 per cent. of the cultivated land under white straw crops, while 22 per cent. is still under green crops and fallow and 17 per cent. still under temporary grasses and clovers.

In the words of the President, " in issuing orders for enforcing good husbandry, the object should be to bring up the standard of farming towards the level of the best farming in the district. It is good husbandry to take a succession of corn crops provided that the land is kept clean and properly manured, so as to maintain its fertility and prevent exhaustion. Provided these precautions are taken the Committee should not prevent a farmer from taking a succession of corn crops."

Detailed Suggestions for Surveyors who Select Grass for Breaking

maps on which the areas of fields have been marked. In many counties these maps have already been prepared in co-operation with the Land Valuation Department.

The surveyor, who is responsible for classifying grass land and for making a record of the circumstances and conditions of each farm, should be accompanied by one or two representative farmers from the district.

Before the grass land of a farm is inspected it will be desirable that particulars of the area of grass and arable land, the stock kept, and the general system of farming adopted, should be obtained.

The surveyor should next decide as to the area of grass which, one of the following reasons, should *not* be ploughed up.

(*a*) A moderate area of grass land should be reserved for working-horses, for partial feeding of milk cows, and for the young stock required to maintain the working stud and the dairy herd.

(*b*) Rich grassland which may be expected to fatten the equivalent of one bullock per acre in an ordinary season, without feeding stuffs.

(*c*) Low-lying land subject to flooding, and natural water meadows.

(*d*) High-lying and exposed land. For the purpose of adding to the grain crop of the country, land above 600 feet in the north or 800 feet in the south, will generally be of little value. In a good season satisfactory crops may be secured above these levels, but, while much land at lower levels is available, it is undesirable to spend labour on soil from which returns are uncertain. An exception may be made in the case of high-lying stock-farms, where, because of the shortage of feeding stuffs, great difficulty is now experienced in carrying stock through the winter. Such farms should, so far as possible, be self-supporting, and the tillage of some acres for providing oats, straw, and roots will often prove to be desirable.

(*e*) Very heavy clay soils of exceptionally poor quality unlikely to pay for tillage under present conditions. Land of this description which would, in the surveyor's opinion, be improved by the use of basic slag should be specially reported on.

(*f*) Very light hungry land. Land of this description should only be broken up when there is an abundance of natural manure, either ordinary farmyard or stable manure, as in the neighbourhood of camps.

The best soils for tillage are medium to strong loams, and not too heavy clays, and, where they occur at a suitable elevation, *they should always be scheduled in the first class* if there is any possibility of getting them properly cultivated.

In regard to clay soil, breaking up should not be called for if the land is low-lying and cannot be drained. On the other hand clay, if only moderately heavy, which is already, or could be, mole drained, should not be excluded from breaking up, especially when it has formerly been used for corn growing.

Clay which could be surface drained, or where crops can be planted in very narrow " lands " or " stetches," may be suitable for corn growing, and this land should be considered, especially when it has been known to grow good crops in the past. Land that must be drained by pipes or tiles should not, owing to the scarcity of these, be broken up during the War.

Light loams and fertile sandy soils are already usually under the plough. Where in grass they should certainly be broken up, unless strong grounds for continuing them in grass can be given.

The condition of ditches should receive careful attention. Much of the existing grass land is injured by neglect of surface drainage. Sometimes the fault is not the farmer's, as the arterial drainage may be defective; but in very many cases the occupier of the land is to blame. Sometimes he is responsible for injury to a neighbour's land as well as to his own. In all such cases occupiers should be ordered to clean out their ditches.

Where a surveyor finds grassland neglected, he would be justified in scheduling it for tillage in circumstances under which, if better managed, it might be allowed to remain, *e.g.*, many meadows are infested with yellow rattle, a weed that is largely due to neglect, and produce much less than their normal yield of hay. Such meadows, if the land is dry and suitable for ploughing, should be scheduled for tillage.

Critics of the plough policy have constantly taken as their motto during the past year—" Till the existing arable land better." No exception can be taken to the advice, but though there is much bad tillage, there is far more bad grass farming than bad arable farming to be seen in the country. In scheduling grassland for breaking up, the surveyor will often be able
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THE CROPPING OF GRASS LAND BROKEN UP FOR 1918 HARVEST.

THE need for rendering ourselves as nearly as possible self-supporting in regard to essential foodstuffs is still vital. It is urgently necessary, therefore, that farmers in making their arrangements for the harvest of 1919 should aim at securing the greatest possible production of corn.

The practice of taking two corn crops in succession was well established before the War, *e.g.*, barley after wheat in a five-course rotation, and oats, or barley, after oats in a six or seven-course rotation where the land lies two or three years in grass. In the case of old grass converted to arable, the taking of a second, or even a third, corn crop in succession is based on at least equally sound principles. Such land is usually rich in potential plant food. As regards the best pastures which have been closely grazed, the plant food as a rule is readily available, consisting of black, formless humus, the result of the decay of plant residues (root and leaf) enriched by nitrogen accumulated from the air by the clovers, and is usually amply sufficient for the needs of two corn crops in succession.

In the case of the poorer grass land where clovers are absent or scarce, and which have been repeatedly mown or imperfectly grazed, there is often a distinct layer of undecayed fibrous material overlying the soil below. Before this matted substance can be converted into plant food, it must be thoroughly broken up and exposed to the influence of the weather. The release of soluble plant food is gradual and may extend over several years. Moreover, the amount immediately available may be so low as to necessitate the addition of artificial or other manures before successful crops can be grown. Where grass land has been broken late in the season, the supply of available plant food may, indeed, be greater in the second than in the first year.

The presence of decaying plant residues in the soil facilitates cultivation and the formation of a suitable tilth, and, in general, so long as this is not entirely exhausted, satisfactory crops can be grown by the help of artificial manures only. The point of exhaustion is postponed by the ploughing in of the stubbles, and, in some cases, *e.g.*, the chalky Boulder Clay of East Anglia, these seem to provide all the organic matter that is required for a series of corn crops in succession. The presence of chalk

assists in the formation of a suitable seed-bed and tends, generally, to establish conditions favourable for healthy plant growth.

Importance of Lime.—Exposure to the elements and the presence of lime are important factors in rendering all soils productive: they are especially potent in the case of soils that have for long been buried under turf, and have, in consequence, become sour and inert. For certain crops, *e.g.*, wheat, barley, beans and clover, lime is often an essential preliminary to success on land that has long remained uncultivated.

Drainage.—The breaking of some of the heavier classes of grass land has revealed the need for drainage. It is impossible for much pipe draining to be undertaken during the War, but mole drainage, where it is practicable, will be found a useful substitute. Failing this, the best plan before sowing is to plough the land in narrow " stetches " along the line of natural fall so as to encourage sub-surface drainage.

Choice of Crops.—1. For Autumn Sowing.—The most useful crop at the present time is *Wheat,* and where wheat has been successfully grown as a first crop it might well be sown again. *Winter Oats* might be grown where conditions are not particularly well suited to wheat, and for the lightest soils *Rye* might be selected. Where, however, the first corn crop has suffered from attacks of wireworms it would be safest to follow with *Beans* (or *Peas* in spring). Wherever possible an autumn-sown crop is to be preferred, as fuller use is thus made of the store of plant food in the soil. In a wet winter there may be considerable loss from " leaching " if recently broken grass land remains uncropped.

Weedy Stubbles.—A repeated corn crop obviously demands a reasonably clean tilth. Some of the worst weeds of arable land—*e.g.*, couch—are, however, usually absent from newly-broken old turf, and in the main such weeds as are present can be fairly easily dealt with. Broad-sharing or cultivating should precede ploughing where the stubbles are foul; but if on account of inclement weather, shortage of labour or other cause this cannot be done, the less weedy stubbles may be ploughed deep with skim-coulter attachment, well consolidated by harrowing, rolling and pressing, and afterwards sown with winter corn or beans. The foulest land should be similarly ploughed and left till spring, when beans, potatoes or roots may be taken as cleaning crops. Autumn-sown *Vetches,* o *Vetches and Oats mixed,* make a good smother crop and affor

2. **For Spring Sowing.**—Of the cereals, *Oats* are the most suitable crop in the North and *Barley* in the South. Where, however, oats can be sown in the South before the middle of March, preferably by the end of February, they may be quite as successful as barley, but experience has shown that late-sown oats are very susceptible to damage by frit fly (" bottling "). Oats, further, seem to be more affected by wireworm than barley, and where wireworm has been prevalent the safer plan would be to sow barley or some of the older, hardier, and better stooling varieties of oats—*e.g.*, Sandy, Blainlie or Golden Rain. Leather Jackets, which are often responsible for much damage to oats in the first year after breaking, are rarely troublesome a second year on the same land, as the eggs of the insect which produce the maggot are laid, as a rule, in grass.

For soils in good condition and situated in the earlier districts *Spring Wheat* may be confidently recommended. Another crop suitable for spring sowing, and in respect of which there is practically no evidence of damage by wireworms, is *Linseed*. This crop may be grown either for its seed, which is useful for feeding purposes, or for flax. It should be noted, however, that the variety best suited to seed production is practically valueless for fibre.

Potatoes.—The general suitability of *Potatoes* for new broken ground is well known. Even the heavier soils work lightly and produce good crops so long as the supply of humus lasts. Furthermore, for cleaning purposes the potato crop has probably no equal; it may, therefore, be grown with advantage on land considered too foul for autumn or spring corn. Even on some of the heavier soils under rotation, potatoes might sometimes be taken instead of a bare fallow; even if a full crop is not produced, potatoes with all the opportunities they afford for cleaning and aëration are likely to be more profitable to the farmer and better for the nation than a bare fallow. *Mangolds* also, especially when grown on the ridge, are admirably adapted for cleaning the land, and the same applies to *Spring Beans*, provided they are grown in rows sufficiently wide apart to permit of adequate inter-cultivation. *Peas* are a very safe crop in the circumstances under review, but should not be attempted on foul land.

With a view to maintaining the supply of organic matter in the soil, keeping down weeds, and providing useful autumn grazing for sheep, it might be advisable in some cases to sow along with the corn crop 2 to 3 lb. of red clover and 8 to 10 lb of Italian rye-grass. Such catch-cropping will materially

help to meet a reduction in the area under food for stock consequent upon the increased cultivation of corn. In a case reported to the Board, 6 lb. of trefoil were sown along with corn on part of a field in 1917. The whole field was again cropped with corn in 1918, and the benefit resulting from the ploughing in of the trefoil was strikingly evident.*

Manures.—Only the poorest soils should require any autumn manurial dressing, and as a rule this should be limited to about 2 cwt. of superphosphate per acre. Basic slag, the supplies of which are relatively short, should be reserved for the heavier clay soils deficient in both phosphates and lime, and in no case should the application exceed 4 cwt. per acre. If necessary the phosphate dressing may be supplemented in the case of cereals with a dressing of sulphate of ammonia at the rate of 1 to 1½ cwt. per acre applied in the spring, or partly in autumn and partly in spring. For spring-sown corn about 2 cwt. superphosphate per acre should be given as a rule, supplemented if necessary, by about 1 cwt. sulphate of ammonia.

For mangolds and potatoes, sulphate of ammonia and superphosphate at the rate of 1 to 2 cwt. of the former and 2 to 4 cwt. of the latter per acre, will, as a rule, be sufficient.

(*This article is also issued as Food Production Leaflet No. 54. Copies may be obtained free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London S.W. 1. Letters of application so addressed need not be stamped.*)

EAR COCKLES IN WHEAT.

W. SOMERVILLE, M.A., D.Sc.,

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TOWARDS harvest it will sometimes be observed that the place of certain grains in the ears of wheat is occupied by black or dark brown bodies very much the size and shape of a grain of wheat. These are produced by a minute eelworm known as *Tylenchus scandens*, or *T. tritici* (formerly called *Vibrio tritici*) which works up from the soil and invades the ear, displacing a larger or smaller proportion of the grains. The popular name of these dark-coloured bodies is ear cockles, purples, or peppercorns, the first name being given to them on account of their resemblance to the seeds of corn cockle. If one of these cockles is [illegible] for a day in a little water and is then

teased out and placed under the microscope, it will be found to be full of tiny, wriggling eelworms.

This trouble is probably fairly widely distributed, and is believed to be most serious in the south and south-west of England. It would be well for farmers to examine grain which they propose to use for seed, and if any cockles are detected they should be removed by careful screening, or, better still, the grain should not be used for seed.

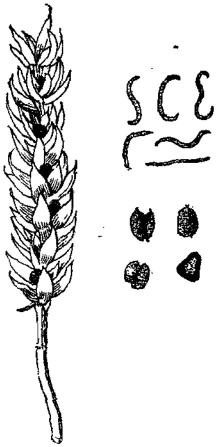
In the autumn of 1917 Mr. F. O. Solomon, of the Dauntsey Agricultural School, West Lavington, Wilts, forwarded a number of affected ears of nursery wheat, and with these it was decided to carry out some pot experiments. These trials were conducted in duplicate in 6-in. pots holding about 5 lb. of soil each. In the following statement the aggregates of the duplicate pots are given. When 20 grains of the nursery wheat were sown per pot (No. 2) along with 20 cockles it was found that 13 ears out of a total number of 55 were more or less affected by cockles. (See Table.) The actual number of cockles found was 105, or an average of about two per ear. In two other pots (No. 1) the same number of grains of the same wheat were sown, but from these the cockles had been picked out, and in no case were any cockled ears found in the crop. It is thus evident that if the cockles are removed from a sample of seed wheat there is no risk of the subsequent crops being affected, but it is difficult to be sure that all the cockles are separated by any process of winnowing or screening, and it is, therefore, safest to reject for seed purposes wheat that has been contaminated. The reduction in yield due to the infection of the cockles was very marked, the crop being little more than half as heavy where infected seed was used as where the cockles had been removed.

The effect of steeping the cockles for 24 hours in a 1 per cent. solution of copper sulphate had no effect on the eelworms (No. 3).

Another variety of wheat, namely Dutch White, from a sound crop, was sown in other pots. When cockles were mixed with the seed, infection was easily obtained, with a consequent reduction in the yield (compare Pots 4 and 5). In this series of pots steeping in copper sulphate seems to have had some small effect in reducing the number of cockled ears and the number of cockles, but for practical purposes the result is negligible (Pot 6). In duplicate pots, instead of sowing 20 cockles per pot only one cockle was deposited in the centre of

attacked, nor so many cockles produced, as where 20 cockles had been employed, infestation was sufficiently pronounced to indicate the damage that may be done to a field, even if the number of cockles in the seed grain is a comparatively small one.

It was found that the eelworms liberated from the single cockle deposited in the centre of a pot had considerable power of moving through the soil, as was evident from the fact that



EAR COCKLES IN WHEAT (*Tylenchus scandens*).—*Left:* An ear of wheat showing 5 cockles. *Right* (above): Six eelworms. *Right* (below): Four cockles, one in section showing the dark covering and paler centre.

the outside plants in the pots were almost as much attacked as the plants growing in the centre and, therefore, in the immediate neighbourhood of the deposited cockle.

At the present time, when one wheat crop often immediately succeeds another, one requires to be specially careful in regard to ear cockles. When a crop is infested, a certain number of cockles fall on the ground in the process of harvesting, and, in such a case, the following wheat crop is sure to be attacked.

The illustration shows an ear of wheat with cockles amongst the chaff scales and also four cockles removed from the ear.

the lower right-hand one being shown in section. Six of the eelworms in characteristic attitude are also illustrated.

Experiment with Nursery Wheat. Seed from Infected Crop.

Pot.	Treatment.	Weight of Straw.	Weight of Ears.	Number of Ears.	Number of Cockled Ears.	Number of Grains.	Number of Cockles.
		grams.	grams.				
1	Cockles removed before sowing grain	180	70	75	0	1720	0
2	20 cockles and 20 grains sowed	102	36	55	13	902	105
3	20 cockles and 20 grains sowed, but steeped 24 hours in 1 per cent. copper sulphate	187	62	69	22	1465	95
	Experiment with Dutch White Wheat. Seed from Sound Crop.						
4	No cockles sowed with grain	158	31	58	0	634	0
5	20 cockles and 20 grains sowed	130	26	48	15	486	78
6	20 cockles and 20 grains sowed, but steeped 24 hours in 1 per cent. copper sulphate	178	30	51	11	650	57
7	1 cockle and 20 grains sowed	285	30	56	5	318	12

Price of Beef during the War in other Countries and the United Kingdom.

THE difficulties of the meat situation in this country, in respect of both rations and prices, are small in comparison with those with which enemy nations have to contend. A comparison of prices at the present moment is instructive.

Information from all sources, amply confirmed by a study of the Press, indicates progressive deterioration in the state of the German meat supply. Horned cattle have diminished greatly in number, and successive catastrophic failures in regard to fodder have resulted in the survivors becoming a great deal more bony and a great deal less meaty than is desirable. The pigs of the Empire, which used to provide some 60 per cent. of the annual meat consumption, have been the victims of reiterated massacres; and, while fodder difficulties have undoubtedly been to some extent alleviated by these drastic proceedings, it is now being realised, with something akin to dismay, that of 27,000,000 pigs in the country at the beginning of the War only 13,000,000 were left by last year, and little more than 5,000,000 are available now. Efforts to regulate the supply

of pork, whether by the fixing of maximum prices (*e.g.*, in Alsace-Lorraine) or by the temporary local restriction of the trade in young pigs (*e.g.*, in Bavaria) have failed utterly.

The main staple of meat supply is, therefore, beef. Earlier in the summer the question had to be faced, whether the remaining cattle should be devoted to the maintenance of the milk supply or treated solely in the light of a prospective meat reserve. The latter view has prevailed; but the decision has not prevented a reduction (discreetly obscured, and broken very gently to the populace) of the meat ration. This would have been very well if, in the last weeks, the meat supply had not collapsed altogether. There was no time to accustom the public to the new state of affairs. Meatless weeks were instituted regardless of protests. The ration was reduced for the whole country (except Berlin), and the consequent tempest of indignation has made the office of German Food Controller more of a nightmare occupation than ever.

It comes out, in spite of intentional ambiguity from the official side, that Berlin (and, for the present, Stuttgart, though no one appears to know why) are to continue their normal ration of 8¾ oz. per week. A graduated reduction, according to the population of the town or district, has taken place, whereby the ration may be as low as 5½ oz. Dutch workmen report that only a little over 5¼ oz. is the maximum to be obtained in the Rhineland industrial towns, and here supplementary rations are no longer distributed. Bavaria prefers to make her own arrangements, though it is not noticeable that the inhabitants of that country get any more, on the average, than the rest of the population. In some places (Berlin, Duisburg, etc.) part of the ration has to be taken in the form of sausage.

In Austria conditions are very much worse than in Germany. Steps have at length been taken to control meat, and the ration (of 3½ oz. per week) is now obtainable on the surrender of pink coupons for the better qualities, and white coupons for the inferior kinds of meat, such as horse-flesh. Three meatless days in the week are observed in Austria and two in Hungary. As meat is unobtainable in the restaurants, and the available ration does not go very far, even in the most economical households, these days are probably not very different from the others so far as the mass of the population is concerned. Though a good deal of Rumanian pork was available earlier in the year (at nearly 4*s*. per lb.), none at all, Rumanian or

illicit trade; but this resource is becoming less and less productive. As in Germany, beef is now the chief kind of meat at the disposal of the consumer, and affords the best subject for comparative study.

RISES IN THE PRICE OF BEEF IN THE VARIOUS COUNTRIES.

	1914.	1915.	1916.	1917.	1918.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*
1. Austria-Hungary ..	0 9	2 0	3 0	6 0	6 9
2. Germany	0 10	1 2	2 10	3 0	3 1½
3. Norway	0 8	1 5	1 6	1 4¼	4 7
4. Denmark	0 8	0 10¼	1 3	0 11	2 0
5. *Holland*	—	0 9	1 2½	0 11½	2 0
6. Switzerland	0 8½	0 10½	0 10½	1 5½	1 8
7. Sweden	0 7½	0 9½	1 1	1 1½	3 10
8. France	0 10½	1 2½	1 4	1 5	2 7
9. Italy	0 6½	0 8½	0 10½	1 2	2 6
10. U.S.A.	1 0	0 11½	1 0½	1 2	1 4
11. Canada	0 11½	1 0	1 1	1 5	1 6½
12. United Kingdom ..	0 8¼	0 10½	1 0¼	1 2½	1 4

NOTE.—These are "representative" prices, *i.e.*, not in all cases the prices actually paid but prices computed with regard to all the relevant conditions as giving a fair average of the prices ruling, during the various years, in each country taken as a whole. In all countries there are local variations, and occasional abnormal quotations, due to special conditions. These factors have been duly considered in drawing up the above table.

The accompanying table shows the course of beef prices in various countries during the war. It exhibits startling differences, not only in actual prices, but in the relative increase, especially during the last year. In the United Kingdom prices have gone up exactly 100 per cent., and this increase has made itself felt quite severely enough. But even in the United States and Canada, where the conditions which make for the increase in European countries are not operative to anything like the same extent, prices have mounted by 33 per cent. and 60 per cent. respectively. The sustained regularity of movement observable in those countries can be found in the United Kingdom alone of European States. That is to say, it is unlikely that any influence other than the natural effect of war conditions has been allowed to react on the consumers' price of beef in this country.

Of enemy countries, Germany shows a rise of 270 per cent., and Austria-Hungary of 800 per cent. Even so, the German rise in price does not adequately represent the true facts of the case, since the ration is exceedingly small in the whole country; even Berlin, which is especially favoured, receiving a very small allowance of meat per week. The German meat

diet, which used to be composed to a great extent of pork, is now nearly 90 per cent. beef; mutton is hardly ever eaten. In Berlin (and, for the present, Stuttgart) the weekly ration is 8¾ oz. Large towns have up to 7 oz., and smaller towns and country places may get 6½ oz. if they are lucky. Some places have been forced to put up with no more than 5 oz. during recent weeks. In addition to this scarcity, at least four weeks during this autumn and winter (in Bavaria twelve weeks) will see no distribution of meat whatever beyond certain kinds of game, of which the prices are very high. Surreptitious trading is rampant throughout Germany, and any supplement to the exiguous rations mentioned above has to come from this doubtful source; and the price that has to be paid is many times the legal maximum. In Austria-Hungary conditions are even more deplorable. Meat has at last been rationed, and the citizens of Vienna may now exchange their coupons for 3½ oz. per week.

The neutral countries abutting on Germany all show heavy increases, the increase per cent. since 1914 being:—In Holland, 166; Denmark, 200; Switzerland, 90; Norway, 600; and Sweden, 300.—(*National Food Journal*, 11th September, 1918.)

An Experiment in War-Time Beef Production.

THE following Note is published at the request of Mr. James Hendrick, B.Sc., F.I.C., Strathcona-Fordyce Professor of Agriculture in the University of Aberdeen:—

In an article in the August issue of the *Journal* (p. 549) Professor T. B. Wood gave an account of certain experiments which were carried out during the winter 1917–18 at a number of different centres in England, Scotland, and Ireland. One of these experiments, which was carried out at Craibstone, the Experimental Farm of the North of Scotland College of Agriculture, was under my direction. I would like to point out a few misconceptions with regard to this experiment which have crept into Professor Wood's article.

1. In the Craibstone experiment there were 20 Irish bullocks, as in the other experiments summarised, and also 20 home-bred bullocks. *These were divided into four lots of ten each.* In Professor Wood's account of the experiment the figures put down for the home-bred bullocks are those which apply to the Irish bullocks and vice versa

cattle 10 lb. per head per week. Both lots made an average increase of 10 lb. per head per week.

3. It is stated that the Spencerfield experiment was under my direction.* The Spencerfield experiment was under the direction of Mr. Wm. Bruce, of the East of Scotland College of Agriculture. Only the Craibstone experiment was under my direction.

4. At Craibstone the cattle were tied up in pairs in stalls, and the dung had to be removed to an open dungstead outside. As the table on p. 554 stands it would indicate that this was not the case. The quantity of dung made per head is influenced to a considerable extent by the method of working, and is much smaller when made on an open dungstead from excreta and litter from cattle tied up in stalls than when made in covered courts or boxes.

5. The amount of litter used for the 20 Irish cattle during the course of the experiment, which lasted 18 weeks, was 7 tons 6 cwt., or $6\frac{1}{2}$ lb. per head per day.

To leave for a moment these questions of fact, I would like to mention that I strongly disagree with some of the statements and deductions in Professor Wood's article. On p. 552 he states that the great increase in live weight made by the cattle at the Norfolk station was possibly "because the animals got a fair ration of good long hay." In the Scotch experiments the animals were kept for a preliminary period before the experiment proper began, and criticising this, Professor Wood says on p. 551: "This, no doubt, tends to scientific accuracy, but the method used at the Norfolk stations gives a better measure of the economic result." At the Norfolk Agricultural Station, Little Snoring, the cattle were weighed the day after they arrived from Ireland and were at once put upon the prescribed ration of roots, straw, hay and cake (p. 550). During the preliminary period, which at Craibstone lasted three weeks, the cattle made very great increases in live weight. This is to be expected. The cattle arrived from Ireland empty and hungry. A bullock has a very capacious alimentary canal which when filled stores a large weight of food. At Craibstone the cattle were not weighed until two days after their arrival from Ireland, when they had already begun to fill up. Nevertheless during the next three weeks they made an average increase of live weight of over 3 lb. per head per day. The great increase made at first gradually fell off as the animals got filled up, and a part of the great increase recorded at Little Snoring was, no doubt, due to the animals being weighed in the first instance when they were in a highly-fasted condition. I cannot think that this is a proper procedure, either from a scientific or from an economic point of view.

* The sentence making this statement w

It seems to me that another reason for the great increase made at Little Snoring was that the animals got a very heavy ration, over 1½ cwt. per head per day, of roots. When animals eat such an excessive amount of watery food their weight is abnormally increased, partly because of the large quantity of material they have to carry in the alimentary canal and partly because other parts of the system become abnormally loaded with water. It seems to me that to compare the increases in weight obtained in this way with increases recorded as they were in the Scotch experiments does not give a useful or reliable result from either a scientific or an economic point of view.

Preparing Rabbits for the Table and Market.

THERE are only two rabbits known under market names, the "Wild" and the "Ostend."

The "Wild Rabbit," as its name implies, is just a wild rabbit paunched but not skinned.

The "Ostend" is a tame rabbit paunched and skinned, and so dressed that the breed cannot be easily detected.

Killing.—Rabbits intended for killing should not receive any food on the last day. Belgian producers are in the habit of killing a rabbit painlessly by holding it up by the two hind legs in the left hand and with the edge of the right hand striking it a sharp blow behind the ears. This method will always kill a young rabbit and leave no bruise. A short stick may be used, but care must be taken to strike at the right spot, because if struck too hard a bruise will be caused and discoloration of the head will appear after skinning.

Tame rabbits should always be bled after having been killed. Make an incision with a sharp-pointed pen-knife in the principal artery in a place near the jaw a little above the middle between the throat and back of the neck. If, as sometimes happens, profuse nasal bleeding occurs at killing, this last operation may be omitted.

Skinning.—Make an incision in either leg and hang the rabbit up with its hind legs as far apart as possible. Then begin cutting the skin open from the right hind leg, and inside the leg down to the back, opening up the other leg. Ease the cutting by pushing the finger under the skin. Cut the skin round the joints, taking care not to cut the sinews, and strip the skin down. Cut away all hindrance in front and

a half-inch of tail bone on the body. Ease the skin front an back with the knife, then grasp with both hands and pull dow as far as possible. To release front legs cut the skin as nea the middle joints as possible, then pull the skin well ove the head, cut out the ears quite close to the skull, and skin th head clean, but leave the eyes. If the skinning has been don right the skin will be whole excepting the cut between th hind legs. No skin should be cut down the belly part, as i the case with wild rabbits.

When the rabbit is skinned, remove from the pelt any particl of fat or flesh still adhering to it, or maggots may appear an damage the skin. Pay particular attention to the tail and hea in this respect.

When the skin is ready for drying, fasten it to a board b pegging the extreme top leg ends to the board, stretch th skin longways and across, and then peg down the sides (at th open edges) and the head. If the tail end remains damp, c any part of the skin crinkles, stretch and peg the ends so tha air may reach them. Sunlight is to be avoided.

To keep moths and maggots away from fur, dust the sk with naphthalene.

Do not bruise the pelt by rough handling, as when dry th bruised part of the pelt so handled is discoloured, which ma lower its value.

After skinning, the rabbit should be paunched at once.

Paunching.—This should be done very carefully. Fir hold the rabbit up by the ears and press the lower part of tl belly with a downward movement to empty the bladde Then, with the point of a knife, make an incision from tl chest bone right up the belly, just deep enough to cut tl skin and not so deep as to injure the intestines. This dang may be avoided by using a pair of sharp scissors here. Cu the ligaments by which the hind legs are joined to the bel and press back the legs so that the inside is easily accessibl Now remove the intestines, but leave liver, lungs, heart ar kidney intact. Great care should be used in taking out tl gall from the liver.

Ostend Style.—Having skinned and paunched the rabb as above, cut off the paws of the front legs, and if the colo of the back paws is different from that of the wild rabbit c these off. Press the stumps of the front legs into two slits ma in either armpits between the first and second rib, pass t

the carcass with a thin stick across the back to show the inside, wipe away all stains, and the "Ostend" rabbit is ready for shaping.

Shaping.—Arrange rabbits of equal size on a board or L-shaped shelves arranged one above the other in a cool and darkened house. Place a board on the rabbits, weight it down and allow it to remain until carcasses are quite cold, when they will have a plump appearance.

Packing.—Place in boxes or hampers lined with clean white paper, a sheet between each layer and on top, and pack closely. Labels should be firmly secured to packages, addresses plainly written and the quickest method of transit chosen.

(This article is also issued as Food Production Leaflet No. 30. Copies may be obtained post free on application.)

Notes on Manures for November, 1918:
From the Rothamsted Experimental Station, Harpenden, Herts.

THE season opens with marked inequalities between one part of the country and another. Whilst some farmers, especially in the Eastern counties, secured their harvest in record time, and were thus in a position to push well forward with their work, others have not yet (8th October) succeeded in carrying their corn, but have the mortification of watching it steadily deteriorating in the stook. The result shows itself not only in the amount of corn available for sale, but in the state of forwardness of the work for next season; for while corn is still out it is not possible to push on with preparations for the new crops, and the damage done this year is carried into next.

Nor is this the end of the farmers' troubles. The raising of wages and the reduction of working hours have increased the cost of all farming operations, but there is no corresponding increase in prices. The way to meet the case is to increase production. This may be possible through the better use of artificial fertilisers and better choice of varieties of crops. Unfortunately artificial fertilisers are not obtainable in unlimited quantities, and farmers may be compelled to adopt methods they would rather have avoided.

Manures should be Ordered Early and Stored Properly.—In this season, as in last, it is eminently desirable to place orders early so as to ensure delivery of fertilisers. If this is done, however, it is essential that satisfactory storage room should be available

Artificial Fertilisers will not tolerate Wetness: they must be kept in a closed shed, be covered with a watertight roof, and stand on a floor to which water cannot gain access. If the place is perfectly dry the fertilisers may be turned out from their bags and stored in a heap, but if there is any suspicion of dampness in the floor, it is safer to keep the manures in their bags, placing these on hurdles or bundles of faggots so as to allow of some circulation of air. If rain leaks in, however, and cannot be excluded, the place must be condemned as unsuitable.

Quantities to Order.—In the past artificial manures have been used very unequally: one man might use 10 cwt. per acre for his potatoes and another, not far off, only 2 to 3 cwt. In present conditions of supplies very heavy dressings ought not to be used unless there is definite evidence that so much is needed. The custom of the district is not always an infallible guide in this matter: fortunately there are large numbers of local experiments that afford useful help in coming to a decision.

As a general rule, **Wheat** grown after potatoes, mangolds, or clover will need no artificial manures. Exceptions arise where the crop does not usually start growth quickly or ripen sufficiently early; in these cases superphosphate or basic slag should be applied: 1½ to 2 cwt. of superphosphate, or 3 to 4 cwt. of basic slag might be given, and it should be applied at the time of sowing the seed. The heavy dressings of basic slag used in some parts of the Eastern and Midland counties should only be given where there is sound reason to suppose them necessary.

Barley grown after roots which have been fed to sheep on the land may need superphosphate if there is reason to fear that the crop will become lodged. In present circumstances 1½ to 2 cwt. per acre might be allowed for this.

Oats may repay rather more generous treatment, and if they are receiving no dung mayhave ¾ to 1½ cwt. sulphate of ammonia, 3 cwt. of superphosphate, and if the soil is light 2 cwt. salt per acre.

Corn crops following a previous corn crop will also requir liberal treatment: ¾ to 1½ cwt. sulphate of ammonia accordin to the condition of the land, 2 to 3 cwt. superphosphate, c double this quantity of slag, and on light or chalky soils 2 to cwt. of salt. Some farmers would be inclined to give more in a case recently brought to the notice of the Rothamste Experimental Station the farmer was proposing to add 2 cw of bone meal to this mixture, but the addition could not t

recommended as there was already sufficient plant food for the needs of the crop.

Roots require very careful consideration. In many parts of the country it is customary to give dung and, in addition, heavy dressings of artificials. For swedes and turnips this plan cannot as a rule be recommended. Large numbers of experiments have shown that swedes and turnips do not generally respond to these heavy dressings, and equally good results have been obtained with smaller applications. Unless, therefore, a farmer has very definite evidence that the artificials will really give a useful return he should not use them too liberally. The practice of giving a small dressing of superphosphate to "bring the roots to the hoe" is, of course, justifiable. One-half cwt. of sulphate of ammonia and 3 cwt. superphosphate might be allowed, but no one should apply the 8 or 10 cwt. per acre of artificials, sometimes used in addition to farmyard manure, unless he has very good reason to expect an adequate return.

This subject is so important that further reference will be made to it later on.

Mangolds present rather a different case as they more definitely respond to fertilisers than swedes or turnips; indeed, no crop is grown that responds so clearly. In most cases it is advantageous to supply a complete dressing: a useful one would be 1 to 1½ cwt. of sulphate of ammonia, 2½ cwt. of superphosphate, and 2½ cwt. of salt per acre in addition to dung.

Potatoes also respond to dressings of artificial fertilisers, though it is by no means clear that they justify the heavy dressings sometimes given. In potato-growing districts it is not unusual to apply 10 cwt. of artificials. In peace time, or when there is abundance of fertilisers, there is not much to be said against this plan, and the possibility of increased crops may justify it; but in war-time, when fertilisers are scarce, it becomes absolutely necessary to economise, and large dressings should not be given *unless there is definite evidence that they are needed by the crop.*

Grass Land presents rather serious difficulties. It is imperative that as much grass as possible should be grown on the reduced acreage so as to provide the farmer with the keep he needs and the Forage Committee with the hay that is in

were available the problem would be relatively simple: basic slag could be used on great areas of grass, especially where the soil is on the heavy side, and in many cases sulphate of ammonia could be applied to give increased bulk of hay. Unfortunately, however, fertiliser supplies are not unlimited, and where there is any restriction it is sound policy at the present time to look after the arable land first and only to give the grass anything that is left over.

Grass land may be considerably improved by cultivation during winter and spring, by cutting down tufts of coarse grass or throwing salt on to them so that stock will graze them down closely. Attention to the ditches and the drain-pipes often effects marked improvement, and in many cases mole drainage is of great benefit. On light soils or in dry situations 3 cwt. of salt per acre may often be of value.

Liming.—During the winter every opportunity should be taken to apply lime, limestone or chalk to soil that needs it. There is still a surprising amount of land in the country requiring this treatment. Samples of soil are not infrequently sent in to the Rothamsted Experimental Station with a request for information as to why crops will not grow satisfactorily: one of the commonest causes of failure is lack of lime. *It cannot be too strongly urged that none of the artificial fertilisers now in use does away with the necessity of adding lime to the soil.* Basic slag and nitrolim help in this way, but they are not sufficient.

It is very desirable that the War Agricultural Committees should emphasise the need for applying lime to the soil and organise methods by which this can be done. The difficulties are less when the work is carried out on a large scale than when each individual farmer tries to do it for himself. The judicious use of lime, combined, when necessary, with attention to drainage, would help very considerably in the economy of fertilisers.

Having calculated the amount of fertilisers needed the next step is to *order without delay*, even the fertilisers that will not be wanted until spring, and store them as directed above. It has been mentioned that either superphosphate or slag can be used on arable land, but in present circumstances there is a good deal to be said for preferring superphosphate: 1 ton of superphosphate goes as far as 2 tons of slag on arable land.

It must not be supposed that the recommendations given here imply any change of opinion as to the effectiveness of fertilisers. The need for careful economy arises from the fact that supplies are low and must therefore be used to the fullest possible advantage. As soon as conditions become more normal the whole case will, it is hoped, have completely altered.

Green Manuring.

ACCORDING to an abstract in the *International Review of the Science and Practice of Agriculture*, June, 1918, the *Comptes rendue des Séances de l'Académie d'Agriculture de France*, 13th March, 1918, describes the results obtained by M. Brétignière with clover and trefoil used as green manures. The sowing of these two leguminous plants in cereals is highly recommended. It is held that the practice, which is already adopted in some cases, should be general, especially in view of the shortage and high price of nitrogenous manures. It is stated that by this means, as at Grignon from 1913 to 1916, the growing of three successive cereal crops becomes possible. The following table shows the increase in yield obtained when oats were sown after green manuring as compared with oats grown without green manuring :—

—	Grain. Cwt. per Acre.	Straw. Cwt. per Acre.
Oats after trefoil	8·95	14·96
,, clover	6·27	10·79
,, vetches	4·32	4·84
,, white mustard	0·42	1·14

The superiority of the trefoil and clover is obvious, especially that of the trefoil, which has the further advantage of costing considerably less than clover.

Besides the trefoil and clover recommended by M. Brétignière, Professor M. Schribaux, at the Institut National Agronomique, advises the use as green manure of crimson clover, which is to be recommended on account of its rapid growth and the relatively low cost of its seed. Fenugreek might also be useful for the same purpose, especially in the south of France, on account of its hardiness and well-developed roots. It is suggested that the value as a green manure of white melilot, already used as such in America, might also be investigated.

Provision of Feeding Stuffs.*

MEASURES are in hand by which the supply of cattle feeding stuffs for winter will be much improved. There are not large stocks of linseed cake, much less of cotton cake, and it is not possible to accept a suggestion made in some quarters and release barley to stock-owners; but the experience of last winter will not be repeated, though the position is, of course, abnormal still. A new

Rationing Order is in course of preparation, and its completion is only delayed until the Maritime Council determines exactly what amount of tonnage can be spared for the import of feeding stuffs. Meanwhile control of the milling trade in regard to offals is being sharpened, millers having been served with a notice that they are to supply offals no priority certificates only, until the holders of certificates shall have been satisfied. Stock owners may obtain priority certificates in respect of dairy cattle, breeding sows and young pigs on application to their Live Stock Commissioners, and should apply forthwith if they have not applied already. This temporary measure will ensure, pending the Order's issue, that those who are entitled to millers' offals shall receive whatever may be their share of the new milling.

In regard to the demand for barley, the Food Controller has carefully reviewed the situation. But, in view of the necessity of securing for the loaf an adequate amount of suitable diluents, it is evident that if any partial release of raw barley were permitted, the enforcement of the Grain Orders would be practically impossible. He has had to decide that no barley which is fit for use in human food shall be sold or used except for either milling for human consumption, malting, munition spirit distilling, vinegar-making or other licensed manufacture. But the extraction in the milling of barley will be considerably reduced. Compared with the amount of offal obtained during the past season, a much larger quantity should be forthcoming for stock-feeding purposes; and the feeding value of the new season's offals will be very much higher than that of offals obtained from the old extraction.

The instruction to flour millers to the effect that all certificates received by them must be given strict priority applies not only to holders of certificates, but also to any dealer who may have had a certificate passed on to him by the holder. In order to ensure delivery, it is necessary for the dealer to send his certificate to the miller with his order. Stocks of cotton cake have been conserved during the summer months in order to meet farmers' needs during the autumn and winter; but, as a small quantity of cotton cake is necessary for dairy cattle in summer, manufacturers were allowed to deliver supplies against priority certificates on the basis of ½ cwt. of cotton cake per cow.

Palm kernel cake has also been conserved; but, in order to meet the needs of pig-owners, about 2,000 tons have recently been released and distributed throughout the country through the medium of the County Feeding Stuffs Committees. This cake is only allowed to be delivered against priority certificates for pigs.

Instructions to a similar effect have been sent to the compound cake and meal manufacturers with regard to pig meal. To save transport, however, a manufacturer is allowed to deliver a maximum quantity of two tons to any one dealer or agent without the production of certificates, provided the dealer or agent gives an undertaking in writing to the effect that he will only dispose of it in fulfilment of priority certificates. Further, in order to meet the needs of the very small buyer, instructions have been given that quantities of 1 cwt. or less may be sold without the production of certificates.

It should be clearly understood that, as regards Great Britain under the Cereals (Restriction) Order, 1918, which came into operation on 1st September, no farmer may use as feed for his live stock any damaged

wheat, rye, barley and dredge corn, or any tailings, dressings, or screenings of wheat, rye, barley and dredge corn unless he holds a licence in writing from the Food Controller.

This announcement does not affect the concessions already promised to small holders and to persons cultivating excess acreage, as to which a special Order is being issued.* (*National Food Journal*, 11th September, 1918.)

Pulping Fruit for Jam.

EARLY in the summer of 1917 it became evident to the Commissioners of the Board of Agriculture and the Food Production Department that the fruit crop for that year was likely to be exceptionally large. Several schemes were accordingly devised, beginning with domestic bottling and other methods of preservation, leading up to a big commercial venture, for the pulping of fruit wherever there was an anticipated surplus. Another consideration which caused the Food Production Department to take action was the assurance they received from the railway companies that waste must inevitably occur because they were quite unable to lift the fruit of Kent and Worcestershire on anything like the scale upon which they had been accustomed to handle it in normal times. In order to avoid such important loss, Treasury sanction was obtained for the equipment of a number of pulping stations and for the purchase of the surplus fruit of localities in which the stations were situated.

These first stations were particularly meant to deal with the plum crop, and were established at Maidstone, Pershore, Marden, Cheltenham, Sittingbourne, Cambridge, Newport (Salop), and Bewdley; while additional stations were prepared at Totnes and Bridgwater to deal with the enormous surplus of apples in Devon and Somerset. Further, the Research Institute of the Bristol University at Long Ashton and a small station at Wedmore, in Somerset, were equipped with plant for the production of apple jelly. The total quantity of pulp laid down at these stations was 10,032 tons, made up of 3,760 tons of plum pulp, 3,520 tons of damson pulp, and 2,752 tons of apple pulp, the whole of which was subsequently dispatched to controlled jam firms, made into jam and distributed to the Forces or to the civilian market under the instructions of the Ministry of Food. Roughly, 48,000 barrels of fruit were stored last year, the average barrel containing from four to five hundredweight of pulp.

A creditable fact in connection with the handling of this tonnage over long distances by rail is that losses from all causes amounted to 1·68 per cent. only. Innumerable baskets had to be hired in which to transport fruit to the pulping stations. This year better arrangements have been made. As the basket makers could not undertake contracts because they had not the raw materials, the Ministry bought a number of osier-beds as they were growing in six or more counties. The osiers were in due time harvested and are now being made into baskets by firms all over England, with whom contracts have been made for over 300,000 baskets. Depots for the sorting and harvesting of the osiers are established at Buckingham, Gloucester, and Somerset.

The importance of pulping becomes at once apparent when it is understood that the process consists of a thorough sterilisation of the

It merely enables the jam-making to be deferred until a convenient opportunity. Taking the jam-boiling "life" of fresh plums to be a month, this in the absence of pulping facilities would mean that the jam firms must work night and day on it; whereas if, in a glut season, you can temporarily preserve the fruit, you extend the jam-boiling life indefinitely, and even into the winter months. The fruit is sterilised by preliminary cooking and then stored in barrels, which have themselves been very carefully sterilised before use. A pulping station when in full work gives employment to about a hundred hands. Previous to the War Great Britain was far behind other countries, and particularly Germany, in the use of pulping and other scientific methods. Certain of the larger firms had been pulping for a number of years, but, generally speaking, the methods of the smaller firms were such that only a very inferior article was produced, and there was a widespread prejudice against the use of fruit-pulping for jam-making. Chemists employed by the Ministry have been carrying out continual research as to the best methods of laying down pulp, and it is considered that the method at present in use is an advance on any previously used in this country or in any other.

Assistance has been given to a large number of jam firms in the United Kingdom, both with plans of the plant in use and with information as to the technical processes involved, and it may be pretty confidently asserted that the pulping stations now owned by the Ministry and by private firms will be capable of dealing with all surplus fruit in the years to come, and will largely, if not entirely, render unnecessary the importation of jam from other countries.

Two pleasing features of this department of the Ministry's activities may be summed up very briefly. The undertaking, far from being a charge upon the public funds, has not only proved self-supporting but has shown a profit that gives a good return upon the capital involved; and the scheme has been so satisfactory to fruit-growers that the Ministry is in almost daily receipt of requests to set up further stations in the fruit-growing districts.

One station is being discontinued, viz., that at Cambridge, from which the plant is being removed to a point nearer to the fruit-producing area of the Isle of Ely, and a new station is being equipped at Erith Bridge. Premises have been secured, and plant is either installed or in course of installation at Faversham, Doncaster, Evesham, Paddock Wood, and Walpole Crosskeys, Norfolk. Buildings have also been secured and are at present being used as stores, to be later equipped with pulping plant if next year's fruit prospects justify the step, at Worcester, Upton-on-Severn, Newnham-on-Severn, and Wisbech. The Wedmore station has been discontinued for the time being, for the reason that jelly making is only approved in glut areas, and this year there is no glut. Arrangements have been made for continuing the apple-jellying process at Hereford and Hele if justified by the crops, but that will not be this year, as all the apples are required for jam.

As evidence of the promise of permanence in the new industry, it is enough to add that frequent applications have been made by fruit-growers and jam manufacturers desirous of purchasing the pulping-stations and their plant. The Ministry, however, purposes to retain them all, at any rate for the duration of the War. (*Nation*

Methods of Obtaining Strong Stocks of Bees for Over-wintering.

MANY bee-keepers make the mistake of attempting to winter the nuclei they have obtained by artificial increase in such a weak condition that they often do not survive the cold weather or the long confinement in the hive during the winter.

In order to avoid failure from this cause the nuclei should be made early in the season, so that by the end of July at least four combs are filled with brood and well covered by bees. The colonies must then be built up during August and September into stocks which are sufficiently strong to winter successfully.

Union of Weak Nuclei.—Nuclei consisting of less than four combs at the end of July should be united to form strong stocks. After selecting two or more nuclei for union, move them gradually together, not more than a yard daily, and only on fine days when the bees are flying, until they are side by side and almost touching. Allow them to remain two days in this position and then towards evening on the second day unite the stocks in one hive. This is carried out as follows: First, remove all the combs in each nucleus not covered with bees, then, after selecting and caging the best queen on a comb in the permanent hive, remove the other queens. Then, after the bees on all the combs have been well dusted with fine pea-flour, place them in the permanent hive properly interspaced. The empty hives are then removed. The operation is completed by releasing the caged queen twenty-four hours after the colonies have been united.

Addition of Frames.—The process of building up is carried out by the gradual addition of frames fitted with full sheets of wired foundation so that the bees can build them out into combs and fill them with brood and food, and in this way increase the strength of the stocks.

The frames must be added one at a time, and should be inserted in the centre of the brood nest. Another new frame should be inserted as soon as the previous one has been drawn out completely, and is not only filled with brood, but is also well covered with bees; several new frames should never be inserted at one operation.

If the apiary contains established stocks of bees, combs of brood may be taken from these and given to the nuclei, thus ensuring more rapid "building up." Only combs containing good-sized patches of *sealed brood* should be taken, for if unsealed brood is given the strength of the bees in the nucleus is overtaxed by the extra labour expended in feeding the brood and in keeping the extra space warm. Not more than two combs of brood should be taken during the season from any one stock, and then only one at a time, at an interval of at least a fortnight between the removal of the first and second combs.

The combs of brood must be given to the nuclei one at a time and inserted in a similar way to new frames of foundation, *i.e.*, in the centre of the brood nest.

It is not absolutely necessary to have the full complement of ten combs in the hive, as the bees will winter quite safely on eight. In fact it is much better to winter the stocks on eight well-filled combs than on ten which are only partially completed.

Temperature of the Hive.—The temperature of the hive must be maintained at about 98° F., not only to enable the bees to secrete wax, but also for brood-rearing. The bees generate heat to a large

the normal means of respiration and the consumption of food. Thus, if they occupy too large a space, the temperature of the hive can only be maintained at the expense of energy required for comb-building, nectar-gathering and brood-rearing. Also too much room often results in the combs being drawn out very irregularly, or else in bulges, owing to the extent to which the working capacity of the bees is taxed.

The nucleus, when formed, is usually placed in a nucleus hive or temporary box, but as soon as it consists of four well-covered combs, it should be transferred to a full-sized hive, and the bees crowded together on the combs by means of a division-board, until after the gradual addition of frames, eight or ten combs are in use.

Feeding to Increase Brood-rearing.—In most districts few nectar-yielding flowers are in bloom after July onwards, and only a small quantity of natural food can, therefore, be collected by the bees; in any case the supply is not sufficient to yield a surplus after the daily needs of the bees have been furnished. It is most necessary, therefore, to supplement the natural food supply by feeding with syrup to induce the colony to continue building out more combs and rapid brood-raising. This syrup must always be fed at this time of the year through a slow feeder, giving just sufficient for the purpose; otherwise, if a rapid feeder is used, the bees will store the surplus syrup in the cells which have been drawn out recently, instead of using them for the rearing of the brood.

A "regulation bottle-feeder" should be used, if available, access being confined to not more than three holes. The bottle should be refilled before it becomes quite empty.

Making Syrup.—Syrup for feeding can be made either from ordinary white cane sugar by dissolving each 1 lb. of sugar in half a pint of water by heating over the fire, or else from medicated candy by dissolving each 1 lb. cake in 10 oz. of water in a similar manner. It is advisable to medicate the syrup made from plain sugar with a strong antiseptic. Izal, Bacterol, or Flavine, may be used for this purpose in the following proportions: One teaspoonful of Izal to every 8 lb. of sugar, one teaspoonful of Bacterol to each 1 lb. of sugar, and one grain of Flavine to each 1 lb. of sugar.

To Prevent Robbing.—In order to prevent robbing, the entrance to the hives must not be wider than ½ in. during the whole of the time feeding is taking place, and the syrup, which should be warmed, must be given late in the evening.

Feeding for Winter Storage.—Towards the end of September, rapid brood-rearing will cease, and the syrup should then be fed more rapidly, so that the cells not required for brood-rearing may be filled with food and sealed over before the cold winter weather sets in. All the nine holes of the "regulation feeding-bottle" should then be exposed to the bees.

Feeding Candy.—If there is the slightest doubt that the supply of food contained in the combs is insufficient to carry the bees through to the following spring, a cake of candy should be placed over the frames when packing down for winter. The candy supply should be renewed from time to time if required. The entrance to the hive should remain open about 5 in. throughout the winter.

Late Swarms.—Late swarms can be built up and strengthened in a similar manner with equal success. The swarms should be first hived

hive they should be "closed up," and the bees crowded together by means of a division-board, until all the frames are well covered with bees. The surplus frames should then be removed, and feeding to obtain rapid brood-raising should commence.

(This article is also issued as Food Production Leaflet No. 55, copies of which may be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W.1. Letters of application so addressed need not be stamped.)

The Menace of Silver Leaf.

REPORTS received by the Food Production Department indicate the increasing seriousness of Silver Leaf disease in fruit trees. In some localities it has become almost a scourge, and some of the most valuable varieties of plums, especially Victoria, are threatened with extinction unless drastic measures are taken to check its extension. The disease occurs also in apples, but less frequently.

Unless active steps are taken to combat it, Silver Leaf spreads relentlessly. It cannot be too widely known therefore that if the affected trees are systematically and energetically dealt with it is possible very largely to control the disease. *By promptly cutting out silvered branches and by rigorously removing all dead trees, or trees which have begun to die back, it has been proved in practice that the spread of the disease is checked.* No other treatment can as yet be advised.

In view of the urgent need ot combating Silver Leaf, the Food Production Department strongly urge fruit growers throughout the country, especially in the important plum-growing districts, to take energetic measures to destroy all trees which have begun to die back, and to cut out the silvered branches of trees otherwise healthy. It is worth some sacrifice to take this in hand at once; for the fungus fructifies chiefly in autumn, and the longer the dead wood bearing the fungus is allowed to remain the greater is the risk of infecting other trees. As it is unlikely, however, that this work can be completed before the leaves fall, all silvered branches and trees which are dying back should be conspicuously marked at once, so that they can be removed so soon as opportunity permits.

In carrying out these operations the following points must be borne in mind:—

1. The minute threads of the fungus are often to be found in the tissues of the wood considerably further down the branch than the level at which the silvered leaves appear. Affected branches should therefore be cut back to a point where no brown stain in the wood can be found.
2. All wounds made by severing branches should be pared over and covered with Stockholm tar. In the ordinary routine work of the garden also care should be taken to avoid injuring plum trees and to apply Stockholm tar to all wounds.
3. Dead or dying trees should be completely grubbed up. Exposed stumps on which the fungus can fructify should not be left in the ground.
4. Severed branches and trees that have been grubbed up should be removed from the plantation immediately and be used for firewood. Small branches should be burnt on the spot. If it

in a shed. To cut down dead trees without subsequently removing them is utterly useless; and to keep a wood-pile in or near a fruit garden is a practice that cannot be too strongly condemned.

The success of the above measures largely depends upon the co-operation of all fruit growers, including the owners of fruit trees in private gardens. Neglected fruit plantations are not only a great danger to other trees, but also to those orchards which are maintained in a proper and sanitary condition. In view of the threatening character which Silver Leaf disease has assumed, it is earnestly hoped that an active campaign against it on the lines indicated above will be commenced and maintained in all parts of the country.

Pruning Fruit Trees and Bushes.

Apple and Pear Trees.—In the general absence of fruit this season, the present time affords a suitable opportunity for carefully attending to the trees whilst the leaves are on, shortening back all summer growths, other than leading shoots, to about five eyes, and thoroughly thinning out the whole tree by removing all unnecessary branches. Too frequently fruit trees are merely headed over and are thus left with a dense mass of growths on the top, a cramped centre, and bare below; whereas, if properly pruned and thinned, they would very likely produce fruit from the base to the top, such as is seen on a cordon-formed tree.

Currant Bushes.—Currant bushes, where not yet pruned, should be attended to immediately, the trees spurred in and any branches that are crowding removed. Often in cottage gardens the currant bushes are left far too thick, with the result that the quality of the fruit suffers.

Raspberries.—These should be carefully gone through and all old canes removed, as well as any surplus young growths, and those of the latter which are retained tied securely to stakes, or wires if the latter are used for supporting the growths. The best and strongest should always be selected for this purpose. If the wood that is removed is not burnt with a view to returning the ashes to the soil for manurial purposes, the old canes may be tied up in bundles and stored in a dry place, as they will be found useful for staking things requiring light support next season.

Charges for Seed Testing at the Official Seed Testing Station.

THE following Notes on the testing of seeds at the Official Seed Testing Station are issued for the information of farmers*:—

Kinds of Seeds to be Tested.—The kinds of seeds that will be tested are those included in the Order (see this *Journal*, July, 1918, p. 477). In addition, seeds of the following plants will also be tested for farmers for their own information; flax or linseed, maze or Indian corn, buckwheat, and mustard.

*Full information as to seed testing under the Testing of Seeds Order is given in Food Production Leaflet No. 47, copies of which may be obtained

Fees to be Paid.—A report will be furnished to *bona-fide* English and Welsh farmers at the rate of 3*d*. per sample on seed which the farmer himself is proposing to sow. Samples to be tested at the 3*d*. rate must be accompanied by an undertaking that the test is not required in connection with a declaration for sale. In the case of tests which a farmer requires for the purpose of a declaration for sale, he is required to pay the fees chargeable to seedsmen, viz., 1*s*. per sample for cereals, 1*s*. 6*d*. for roots and vegetables, other than mangolds and beet, and 2*s*. for mangolds, beet, grasses and clovers.

If the fee does not accompany the sample no notice will be taken of it. When the fee or fees payable amount to 6*d*. or over, the remittance must be made by postal order which should be made payable to—"Food Production Department, 72, Victoria Street, London, S.W. 1."

For a single farmer's test three penny stamps may be sent.

Directions as to sending samples to the Station are given on p. 883.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester; and 1, St. Andrew's Crescent, Cardiff.*

THE following Circular Letter (No. C.L. 79/C. 1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 20th September:—

The Food Production Programme for 1919.

SIR,—At the recent conference with the Chairmen of the Executive Committees I promised to circulate those portions of the notes from which I spoke which have reference to the details of surveying and breaking up grass land. This memorandum is now sent herewith,* and I would urge that immediate arrangements should be made for carrying out a survey and classification of grass land on the lines suggested. A specimen card showing the particulars which should be recorded will be sent to you in a few days.

In regard to the breaking up programme, I think it desirable that committees should not contract for ploughing up stubbles beyond a limited period of time. It is realised that for getting in a big wheat area this year tractors may have to help on the stubbles for the next six weeks or so, but as the policy of the Department in purchasing tractors was, and is, to have available a means of breaking up additional grass land and cultivating additional plough land, it is only reasonable that the first call upon the Government's tractors should be devoted

This is written to the Chairmen of Committees and Executive Officers as a hint rather than as an instruction at this moment. It may be necessary to give some more definite ruling on this point in the near future, and in the meantime the matter is mentioned so that tractors may not be fully booked up from November onwards for other work than breaking up grass land.

I am, etc.,
(Signed) CHARLES FIELDING,
Director-General.

AN Order (No. 1099), dated 4th September, 1918, has been made by the Food Controller, to the effect that :—

The Small and Additional Acreage Order, 1918.

1. Notwithstanding the terms of any Order to the contrary it shall be lawful for—

(*a*) A person whose total acreage under cultivation in the year 1918 does not exceed, in England or Wales 1 acre, in Scotland 5 acres, or in Ireland 10 acres, to use the cereal crop (other than wheat) harvested on such land in the year 1918 for the purpose of feeding any livestock belonging to him;

(*b*) A person who in England or Wales has ploughed permanent grass land in excess of any amount of such land directed to be ploughed for cultivation in the year 1918 by any directions of the Executive Committee given prior to 9th March, 1918 (hereinafter called Excess Land), to use for the purpose of feeding any livestock belonging to him such part of his total cereal crop (other than wheat) harvested in the year 1918 as shall be certified by the Food Controller to be equal in amount to the cereal crop (other than wheat) harvested on his excess land in the year 1918, provided that :

(i.) Such person before ploughing such excess land shall have given particulars of the excess land to the executive committee ; and

(ii.) Such person before ploughing excess land shall have obtained a Cultivation Order from the Executive Committee.

2. Every application for a certificate of the Food Controller under Clause 1 (*b*) of this Order shall be made on such form as shall be prescribed.

3. The Food Controller may from time to time give any directions that he may think proper for securing that no cereals not authorised by this Order shall be used for feeding livestock in contravention of any other Order made by the Food Controller, and every person using cereals for feeding livestock by virtue of this Order shall duly comply with any such directions and every such person shall give to the Food Controller all such information as he may from time to time require as to the disposal of the residue of his crop of cereals.

4. Nothing in this Order contained shall authorise the feeding of any livestock in contravention of the Horses (Rationing) Order, 1918.*

5. For the purposes of this Order :—

The expression "Executive Committee" in connection with any land shall mean the Executive Committee exercising

any of the powers of the Board of Agriculture and Fisheries under Regulation 2M of the Defence of the Realm Regulations for the County or County Borough in which such land is situated.

The expression "permanent grass land" shall mean such land as has been grass land during the whole of the five years immediately preceding the date of this Order.

THE following Circular Letter (No. A/314/6) was addressed to the County Councils in England and Wales by the Board on 11th September :—

The Purchase of Land Suitable for Small Holdings.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to state that as a result of the receipt of a resolution dated the 8th July last from the Gloucestershire County Council, a resolution since endorsed by a number of other councils, he approached the Treasury with a view to obtaining their sanction to the purchase by county councils of land suitable for small holdings out of balances in the hands of the councils.

2. The Treasury have now informed the Board that they will not raise objection to the proposal that the purchase money for land suitable for small holding purposes may be provided out of balances in the hands of the county councils on the understanding that :—

(i.) Each case will require the sanction of the Board of Agriculture and Fisheries ;

(ii.) Such sanction will only be given where the land is specially suitable and is offered on advantageous terms and cannot be obtained by way of lease or purchase by rent-charge ;

(iii.) Only such balances are used for the purpose as are not likely to be required for other purposes for some years, and that the fact of their having been so used shall not be regarded as giving the councils a claim to borrow from any Government Fund for the purposes to which they might otherwise have been applied.

3. I am to explain that the total expenditure which the Treasury are prepared to approve on these lines is limited to £100,000, and that the arrangement does not remove the embargo on the councils' borrowing powers which still remains in force. The concession is only intended to apply to cases where the acquisition of particular areas of land is exceptionally desirable.

4. I am to ask that any proposals that may be submitted to the Board for the purchase of land for small holdings in the above circumstances may be accompanied by a plan of the property, together with full information as to the reasons why the acquisition of the land is specially desirable.

5. Mr. Prothero will also be glad to be informed in each case as to whether efforts have been made by the council either to acquire the land on lease, or to purchase it on the terms that payment shall be made by way of a rent-charge or other annual payment.

I am, etc.,

(Signed) A. D. HALL,

Secr...

THE following Circular Letter was addressed to the County Councils in England and Wales by the Board on 16th September :—

Settlement of Ex-Service Men on the Land.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to acquaint you that under the provisions of the Small Holding Colonies (Amendment) Act, 1918, the object of which is to provide land for ex-Service men, the area of land which may be acquired for the establishment of small-holding colonies has been raised from 4,500 acres in England (excluding Monmouthshire) and 2,000 acres in Wales and Monmouthshire (as provided by Sub-section (3) of Section 1 of the Small Holding Colonies Act, 1916) to 45,000 acres in England (excluding Monmouthshire) and 20,000 acres in Wales and Monmouthshire.

2. I am further to acquaint you that the amending Act provides that " the Board may, as respects any county, with the consent of the council of that county, employ that council as their agents, and vest in them all the powers hereby or by the principal Act conferred upon them, in addition to those vested in such council by virtue of the Small Holdings and Allotments Act, 1908," and " that no portion of the additional land authorised by this Act to be acquired by the Board of Agriculture and Fisheries shall be so acquired except after consultation with the Chairman of the Council of the county in which the land proposed to be acquired is situate, or with a committee of that council.'"

3. The amending Act further provides that " the land shall not be acquired otherwise than by taking the same on lease, or purchasing it in consideration of the grant of a rent-charge or other annual payment, or by taking the same in feu."

4. In this connection I am to remind you (a) that Section 40 (1) of the Small Holdings and Allotments Act, 1908, enables a limited owner to lease land to a county council for the purpose of small holdings for a term not exceeding 35 years, either with or without a right of renewal, for a further term not being less than 14 nor more than 35 years; (b) that Section 40 (5) enables tenants for life to grant settled land to a county council in perpetuity at a fee farm rent or other rent secured by condition of re-entry, or otherwise as may be agreed upon; and (c) that Sub-section (4) of the same Section enables a sale to be made for the best rent-charge that can be reasonably obtained, having regard to the purpose for which the land is purchased, and to all the circumstances of the case.

5. I am also to point out that the Sailors and Soldiers (Gifts for Land Settlement) Act, 1916, empowers the Board, or a County Council, to accept and administer gifts for the settlement of ex-sailors and soldiers on the land.

6. Mr. Prothero much regrets the limitations that existing circumstances have imposed on the provision of land for the settlement of sailors and soldiers both through county councils and in connection with schemes under the direct supervision of the State, but he is confident that while the provision of capital for the purchase of land from Government funds is likely to be impracticable both during the War and for some time after the conclusion of peace, yet he is satisfied that much can be done with the active co-operation of the County Councils and that many landowners will be found ready to provide land on the terms

7. There is evidence that landowners all over the country are genuinely anxious to help the returned sailor or soldier, and although they might hesitate to take upon themselves the immediate risks inherent in a settlement policy, yet they would be willing either to grant a long lease or to sell in exchange for a perpetual rent-charge based on the capital value of the land.

8. I am, therefore, to invite your Council to co-operate with the Board in obtaining land that will be available for settlement purposes as men come to be discharged from the Services. The Board will be able to send an officer to confer with your Council as to the schemes that may most conveniently be adopted for the purpose, but as a preliminary step Mr. Prothero suggests that an inquiry should be instituted among the principal landowners in your county as to the land they may be prepared to offer under either of the Acts referred to above. Inquiry should be also directed as to the existence of glebe or land belonging to charities suitable for settlement which could, it is believed, in many cases readily be exchanged for a rent-charge in the manner contemplated by the Act. The Board would be glad to receive at an early date a schedule of any land so offered, together with any preliminary suggestions as to the scheme proposed for its utilisation.

9. Mr. Prothero will be glad to learn that your Council are prepared to assist in the manner indicated, and having in view the importance and urgency of the question he would suggest that a Committee of the Council should be specially charged with the matter. The Small Holdings and Allotments Committee may be the most suitable body to entrust with the work, in view of the experience gained in the administration of the Small Holdings and Allotments Act, 1908, and their knowledge of the conditions essential to the success of small holdings under varying local conditions, or it may prove more desirable to set up a special committee for the purpose.

10. I am further to suggest that as no reliable estimate is available at present of the number of ex-Service men who are desirous of adopting agriculture as a means of livelihood after the War, a preliminary inquiry should be made by your Council amongst the soldiers working on farms in your county. Some counties have already adopted that course, with the result that several applications have been received from men possessed of the capital and experience necessary to enable a holding to be worked successfully. I am to enclose a form of return* which the Board suggest would be suitable for the purpose and which the Board are about to have distributed throughout His Majesty's Forces with a view to ascertain, as far as possible, the probable extent of the actual demand for land and of the localities in which it is desired.

11. With regard to the question of equipment, the Board have power under the Small Holding Colonies Acts to let or manage the land or improve the same by the erection of buildings or otherwise; and as regards the Sailors and Soldiers (Gifts for Land Settlement) Act, all expenses incurred by the Board or the Council in relation to any gift are to be defrayed out of the trust property or the proceeds or income thereof, or out of money borrowed on the security of the trust property. It is probable, therefore, that no difficulty will arise in connection with the equipment of land acquired under those Acts.

12. The embargo on borrowing still remains so far as land to be

cerned, but it is hoped that arrangements may be made under which loans for the equipment if not for the purchase of land may be obtained.

13. With regard to the size of the blocks of land for settlement purposes, Mr. Prothero feels that no hard and fast rule can be laid down in that respect. It may be found necessary to provide comparatively large blocks of land of, say, 1,000 acres or more for men who have been resident in the towns—settlers who require the initiation into farming and guidance that can be provided by a colony and for those who are prepared to move from their own locality. There will, however, be a large number of men who will desire to settle in the districts in which they were born and bred and in which, probably, their families have lived for generations. Such men may be set up on comparatively small blocks of land, and even in cottages with not more than half an acre of land attached. Again, some parishes may desire to provide a War memorial, and for that purpose it is hoped that residents may come forward to give the land and that the parish will be willing to raise the funds required for the necessary houses and buildings. It may be possible to initiate a county scheme on such lines. It is evident, therefore, that a considerable amount of elasticity must be allowed, and that schemes for land settlement may take the form of scattered small holdings of a few acres, or of gardens up to half an acre of land attached to suitable cottages, or of colonies covering a wide area.

14. The Board are in constant touch with the Office of Woods, who manage the Crown Lands, and with the Ecclesiastical Commissioners. These Departments for several years past have acquainted the Board with any change of tenancy which is in prospect, in order to give the Board an opportunity of considering the suitability of the land for small holdings. The Board are about to circularise the universities, and colleges, the trustees of charities and similar public bodies, who hold property in land, inviting them to adopt the same procedure. By one or other of these means it is hoped that sufficient land may be acquired to meet all definite demands for settlement immediately on demobilisation. As further demands may be anticipated it will be necessary at the same time to obtain information as to the further land that can be made available to meet possible calls. Mr. Prothero is confident that the Board may count on the assistance both of individuals and corporations in their endeavour to set up a national scheme for providing land for the returned sailor or soldier.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

THE following Memorandum (No. C.L. 133/L. 1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 17th September :—

Agricultural Exemptions.

It has been agreed between the Food Production Department of the Board of Agriculture and Fisheries, the Local Government Board, and the Minister of National Service, that men engaged in the occupations specified below shall be, in future, entitled to be protected from military service as stated in this Memorandum.

1. Men principally and usually engaged throughout the year in the following occupations shall be held to be included in one or other of

28th May, 1918, provided *that they were so occupied at that date.* These men will accordingly be entitled to receive vouchers from Agricultural Executive Committees and should not be dealt with on occupational grounds by Tribunals. It has been agreed with the Local Government Board that if cases of any of these men come before Tribunals, National Service representatives should inform the latter of this agreement.

(*a*) Rabbit-catchers, rat and mole-catchers, vermin-killers.

(*b*) Hedgers, ditchers and drainers.

(*c*) Men wholly employed on individual agricultural estates in the following occupations :—

Agricultural masons, bricklayers, carpenters, joiners, slaters, and men engaged in fencing or in making walls or gates.

(*d*) Men engaged in looking after machinery for pumping-stations, etc., on agricultural estates.

(*e*) Sheep-dippers, shearers, and drovers.

(*f*) Men wholly engaged in willow farming and withy growing.

(*g*) Managers of sets of threshing-tackle.

(*h*) Men engaged in flax cultivation.

(*i*) Auctioneers and valuers who are at present engaged as land and estate agents, whose services are considered by the Agricultural Executive Committee as being essential for the purpose of carrying on work connected with agriculture and food production.

2. Agricultural vouchers issued to men wholly engaged in the breeding of horses, whether heavy or light, will not be objected to by National Service representatives.

3. The following classes will not be entitled to agricultural vouchers, and any vouchers which have been issued to them should be withdrawn :—

(*a*) *Estate Foresters and Woodmen.*—With regard to these men the Food Production Department is to submit to the Director-General of Recruiting a proposal for the inclusion of certain estate foresters and woodmen of definite ages and grades in the new certified occupation list. (Since the date of the agreement these men have been included in the new list of certified occupations, advance proofs of which are in the hands of Regions).

(*b*) *Private Gardeners.*—These men will be dealt with by way of separate instructions.

(*c*) *Men Engaged in Lime Burning for Agricultural Purposes.*—With regard to these men, the Food Production Department will submit lists of firms engaged in lime burning for agricultural purposes to the Ministry of National Service and the Trade Exemptions Department will consider what instructions should be issued in the case of such men as are not within the certified occupation list.

(*d*) *Poultry Farmers.*—These men will be dealt with by tribunals only.

(*e*) *Milk Recorders, Nicotine Producers, Members of Agricultural Wages Board and Sack Contractors.*—The Food Production Department will refer the cases of the small number of men employed in these occupations to the Ministry, which will deal with them by way of special instructions.

(*f*) *Heads of Departments and Exports in Retail Seed Firms.*—The Food Production Department will submit to the Ministry a further

4. In future, agricultural vouchers to men employed in agriculture who are members of Agricultural Executive Committees may be granted by Agricultural Executive Committees on the recommendation of the District Commissioner of the Board of Agriculture in agreement with the Regional Director of National Service.

THE following Memorandum (No. C.L. 134/L.1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 17th September :—

Exemption of Kitchen Gardeners.

The following copy of an instruction which has been issued to Tribunals is forwarded for your information and guidance.

1. The attention of Tribunals is drawn to the importance as a part of the general policy of food production, of maintaining the kitchen gardens of private households.

Exemption should generally not be refused to an experienced kitchen gardener whose exemption is found to be essential for the production of large quantities of necessary food supplies. Before, however, granting exemption in any case, the Tribunals should satisfy themselves (*a*) that the principal and usual occupation of the man is, and has been for a considerable time, that of a kitchen gardener, (*b*) that most of his time is spent in raising necessary food supplies, and (*c*) that, unless he is of low medical grade, a suitable substitute could not be obtained for him or, with effort, other arrangements could not be made for the essential part of his work.

If a man is engaged partly on kitchen gardening and partly on other work which is not of national importance, exemption should, where reasonable, be granted on condition that, in addition to his ordinary work as a kitchen gardener, he devotes a specified time to other essential work, particularly, where opportunity offers, to other kitchen gardening or agriculture.

The above recommendations do not apply to men who cultivate gardens or allotments in their spare time.

2. In some cases agricultural vouchers have been mistakenly given to men engaged in kitchen gardening. Any application for the exemption of a man from whom an agricultural voucher so given has been withdrawn should be entertained, although made out of time. Assistant-directors of National Service have been instructed to give any necessary consent in such cases.

As explained in R.207,* market gardeners are entitled to be granted agricultural vouchers on occupational grounds, and this memorandum does not apply to them.

THE following Army Council Instruction (No. 998 of 1918) was issued by the War Office on 7th September :—

Withdrawal of Category A Men from Agricultural Companies.

1. Recent medical inspections show that there are a number of category A men serving in agricultural companies, and it has accordingly been decided (subject to the exceptions shown in paragraph 2) to withdraw them, in England and Wales, after 15th September, 1918, and in Scotland after 15th October, 1918, for military duty whenever they can be replaced by soldiers of a lower category

2. Those who are employed as tractor-drivers, blacksmiths, farriers, wheelwrights, steam-plough drivers, threshing-engine drivers, and feeders will not be withdrawn for the present.

3. Soldiers, who are eligible, will continue to be posted to agricultural companies, but those sent out for farm work on or after 1st August will be counted as substitutes for a corresponding number of A men who will be withdrawn after the 15th September and 15th October, as mentioned in paragraph 1. It should, therefore, be made clear to employers that it may be necessary to move men elsewhere later on.

4. The arrangements for withdrawing the A men will be carried out between the County Agricultural Executive Committees in England and Wales, Sub-Commissioners in Scotland, and the Commandants of Agricultural Distribution Centres.

5. As far as possible, trained or partly-trained soldiers will be selected for withdrawal in priority to others, but due consideration will be given to the inconvenience which may be occasioned if certain men are taken from their present employment sooner than is absolutely necessary.

6. The Agricultural Executive Committees may decide that, in some cases, it is not necessary to replace a category A man withdrawn from a farm, in which case they will be free to allot the lower category man, supplied as a substitute, to any other farm which is in need of labour.

7. If at any time there are no further A men on the strength of the companies at a centre, a report will be made to the War Office through Command Headquarters, so that instructions may be issued for the disposal of the substitutes who would be sent there.

8. A careful record will be kept with each company of the number of A men withdrawn, and how each man is disposed of. They will be transferred, under orders issned by Command Headquarters, to the arm of the Service for which they are most suited.

9. As A men can only be withdrawn as lower category men become available, it is most important that all experienced farm labourers now serving in units at home in a lower category than A should be transferred to the Labour Corps, and posted to Agricultural Companies. The only exceptions are B (i) men who are fully-trained Infantry men, and men in technical corps more usefully employed at a trade from which they cannot be relieved, and which would be of no value in agriculture.

10. It may be possible in certain instances to withdraw category A men before 15th September, but this will only be done with the consent of the County Agricultural Executive Committee.

Payment of Soldier Labour.

ACCORDING to a Memorandum (No. C.L. 137, L.2), dated 23rd September, 1918, addressed to Agricultural Executive Committees by the Food Production Department of the Board, it has been necessary, in view of the decisions of the Agricultural Wages Board, to amend the conditions regarding the payment of soldiers engaged on agricultural work to provide for a minimum cash payment of *12s. 6d.* per week, and the payment of overtime at the new rates.

The farmer will have the same right of appeal to the District Wages Committee to pay a lower wage as in the case of his civilian

The Planting of "Top" Fruit.

THE Food Production Department announce that they have recently received numerous applications from fruit-growers and fruit growers' associations relative to planting "top" fruit trees, such as apples, pears, plums, and cherries. In these cases the applicant is referred to the Agricultural Executive Committee of the county in which his land is situated. The Department suggests that no objection should be raised to planting fruit of this nature, provided the area is not excessive and provided that in the case of arable land it is intercropped with a vegetable or root crop other than rhubarb, celery, asparagus, or seakale.

Nothing should be done to discourage an extension of the fruit industry in view of the fact that (where intercropping is practised) no reduction in the supply of food is involved, while the opportunity is also given to fruit growers to establish themselves before foreign competition recommences.

The Potatoes (Registration of Wholesale Dealers) Order, 1918, as Amended by an Order of the Food Controller, No. 623: General Licence.

AN Order (No. 1039), dated 21st August, 1918, has been made by the Food Controller to the following effect :—

Notwithstanding anything contained in the Potatoes (Registration of Wholesale Dealers) Order, 1918,* the Food Controller hereby authorises every person holding a certificate of registration as a wholesale dealer in seed potatoes under the Potatoes Order, 1917,† to sell such potatoes by wholesale in accordance with the terms of such certificate until the 1st November, 1918.

Restriction on Sales of Potatoes for Delivery on or after 1st November, 1918.

SOME misapprehension has arisen as to the intention of the Potatoes (1918 Crop) (Restriction) Order,‡ which prohibits sales of potatoes (other than first early varieties) for delivery on and after the 1st November except under the licence of the Food Controller. The Ministry of Food announce that licences will be granted freely to registered wholesale dealers to purchase potatoes in the ground and that sales of potatoes in the ground by or on behalf of the grower may proceed subject to the purchaser obtaining the necessary licence. These licences will be granted subject to the following conditions :—

(a) The purchaser will be deemed to be the grower of the potatoes for the purpose of any Order issued in relation to the 1918 potato crop, and

(b) The purchaser must not make any claim for compensation in respect of such potatoes if he subsequently incurs loss through the action of the Ministry of Food in prescribing maximum prices for potatoes or any general cancellation of contracts. Applications for licences should be made

* Printed in this Journal, July, 1918, p. 48[illegible]

to the Director of Vegetable Supplies, 100, Cromwell Road, London, S.W. 7, and should state the name and situation of the farm or holding on which the potatoes have been grown and the acreage and varieties of potatoes which the applicant has agreed to purchase.

The Vegetable Marrow Order, 1918.

AN Order (No. 1082), dated 31st August, 1918, has been made by *the Food Controller, providing that a person shall not* sell or offer or expose for sale or buy or offer to buy any *vegetable marrows at prices exceeding* the maximum prices under the Order. The Order *fixes maximum prices both for wholesale and* retail sales.*

The Testing of Seeds Order: Selling Cereals and Grass Seeds for Sowing.

THE attention of farmers in England and Wales is drawn by the Food Production Department of the Board to the fact that when selling wheat, barley, oats, rye, clover seed, etc., to other farmers for sowing it is necessary, under the Testing of Seeds Order, 1918, that these should be tested and that the required declaration should be made in writing to the purchaser at or before the time of sale or delivery. In the case of cereal seeds, however, it is sufficient, by virtue of a general licence recently issued by the Board of Agriculture and Fisheries, for the declaration to be delivered to the purchaser within one month of the sale or delivery, and not necessarily at or before the date on which this is effected.

In the case of wheat, barley, oats, and rye, the declaration must state :—

(1) The name and address of the seller.

(2) The variety.

(3) The percentage of germination (if the germination is at or above the standards set out in the Order, viz., wheat and barley 90 per cent., oats 85 per cent., rye 80 per cent., a statement to that effect is sufficient, but if below these standards the actual percentage must be declared).

(4) The date of the germination test (unless made within six months of sale).

No declaration need be made in respect of the purity of cereals.

The germination test may be made by the farmer himself, or by a private testing station, or by the Official Seed Testing Station, 72, Victoria Street, London, S.W. 1.

Farmers may sell seeds wholesale to a merchant as "seeds as grown," in which case only a declaration as to variety is required.

Particulars as to the declaration needed in the case of sales of other kinds of scheduled seeds and of the regulations with regard to the Official Seed Testing Station are given in Food Production Leaflet No. 47, copies of which may be obtained free of charge on application to the Board of Agriculture, 3, St. James's Square, London, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board towards the end of September:—

Samples for Seed Testing.

Farmers who intend to avail themselves of the Seed Testing Station for the purpose of having their cereals and other seeds tested are urgently requested to send sufficiently large samples for the purpose. In the case of wheat, oats, barley, and rye, not less than 4 oz. should be sent. It causes great delay at the Station when samples that are too small are sent, as these have to be returned and larger samples asked for; this also causes disappointment to the sender, inasmuch as it adds to the time that must elapse before a report can be prepared. If several samples are forwarded, farmers must also clearly label each package with a reference by which the samples can be identified when the reports are sent out. No time should be lost in sending samples forward to the Station immediately after threshing, and it is hoped that all wheat samples will have come to hand by the middle of November at the latest. Farmers can obtain envelopes for the purpose of sending samples to the Station on making application to the Food Production Department, 72, Victoria Street, London, S.W.1. As to fees, see p. 871 of this *Journal*.

AN Order (No. 1223), dated 27th September, 1918, has been made by the Food Controller to the following effect:—

The Pig (Sales) Order, 1918.

1. *Restriction on Slaughter of Pigs.*—No person shall on or after the 20th October, 1918, slaughter any pig unless such pig has within 14 days immediately preceding the date of slaughter been bought and sold in a market in Great Britain in accordance with the provisions of this Order relating to the sale of pigs for slaughter.

The restriction on slaughter imposed by this Clause shall not apply to—

(i.) Slaughter of a pig under the powers conferred by the Diseases of Animals Acts, 1894 to 1914, or any Order made thereunder.

(ii.) Slaughter of a pig when such slaughter is authorised by an officer of the Board of Agriculture and Fisheries or the Board of Agriculture for Scotland.

(iii.) Slaughter of a pig when such slaughter is immediately necessary or desirable on account of accidental injury to the animal or its illness or for any other exceptional reason or purpose.

(iv.) Slaughter by a self-supplier wholly or mainly for the purpose of his supply.

(v.) Slaughter of a pig when the sale of such pig for slaughter elsewhere than in a market is authorised by this Order or has been authorised by the Food Controller and has been made in accordance with directions given by or on behalf of the Food Controller.

Provided that (except where slaughter duly takes place in accordance with the provisions of sub-clause (v.) hereof) notice of such slaughter and such other particulars as may from time to time be required shall be given within seven days thereafter to the Food Control Committee for the district in which the owner of the pig at the time of slaughter is at such time residing.

(*b*) The restriction on sales imposed by this Clause shall not apply to —

(i.) The sale of a pig by a small owner or by a person authorised in that behalf by the Food Controller where such sale is made in accordance with the directions given by or on behalf of the Food Controller.

(ii.) The sale of a pig pursuant to directions given by an officer of the Board of Agriculture and Fisheries, or the Board of Agriculture for Scotland, where directions for the slaughter of the pig have been given by such officer and have been duly complied with.

3. *Conditions of Sale in Markets.*—On and after the 6th October, 1918, no live pig shall be sold in a market for slaughter and no dead pig shall be sold in a market except in accordance with the following provisions :—

(*a*) The pig shall be sold only to a person who is authorised by the Food Controller to buy pigs on his behalf (hereinafter called a Government Buyer) ;

(*b*) The maximum price on the occasion of a sale to a Government Buyer shall be :—

(i.) Where a person sells any live pig otherwise than by dead weight, a sum calculated at the rate of 21*s.* per score of the live weight, less the sum of 2*s.* 6*d.* per pig ; and

(ii.) where a person sells any live pig by dead weight or any dead pig a sum calculated at the rate of 28*s.* per score of the dead weight, if the offals are included in the sale, and at the rate of 26*s.* 9*d.* per score of the dead weight if the offals are not included in the sale, less in either case the sum of 2*s.* 6*d.* per pig.

Provided that the deduction of 2*s.* 6*d.* per pig shall not be made in the case of a pig weighing on sale 150 lb. live weight or less.

4. *Conditions of Sale elsewhere than in Markets.*—The provisions of Clause 3 hereof shall apply where a pig is sold for slaughter, or where a dead pig is sold elsewhere than in a market by a small owner or by a person (not being a small owner) authorised in that behalf in accordance with the provisions of Clause 2 (*b*), except that in the case of such a sale by a small owner the deduction of 2*s.* 6*d.* per pig shall not be made.

5. *Variation of Prices.*—The Food Controller may from time to time vary any or all of the prices specified in Clauses 3 and 4 hereof by notice under this Order.

6. *Ascertaining Live Weight.*—Where a live pig is sold for slaughter otherwise than by dead weight, its weight for the purpose of this Order shall be its weight as ascertained at the time of sale by the Live Stock Auctioneer engaged in the sale or the market authority in whose market the pig is sold, or as ascertained at any time after sale by a person authorised in that behalf by the Food Controller or a Food Committee ; or if not so ascertained its live weight at the place of slaughter.

7. *Ascertaining Dead Weight.*—For the purpose of ascertaining the dead weight of a pig the following rules shall apply : If the carcass of the pig be weighed less than two hours after slaughter the dead weight shall be the weight of the dressed carcass then ascertained with a deduction at the rate of 1 lb. in each completed 50 lb. or part thereof ; if it be weighed more than two hours but less than 12 hours after slaughter, the dead weight shall be the weight of the dressed carcass then ascertained with a deduction at the rate of 1 lb. in each completed 100 lb. thereof ; if it be weighed more than 12 hours after slaughter the dead weight shall be the weight of the dressed carca

8. *Directions.*—(*a*) Any person authorised in that behalf by the Food ontroller may give directions as to the sale, weighing, allocation, or elivery of any pig for slaughter or of any dead pig, and all persons oncerned shall comply with such directions.

(*b*) Any person authorised in that behalf by the Food Controller 1ay at any time determine whether a pig is fit for slaughter, and the etermination of such person shall be conclusive upon the question ·hether a pig is fit for slaughter.

(*c*) Where the authorised person has determined that a pig in any 1arket is fit for slaughter, or has given directions as to the sale, weighing, llocation or delivery of any pig, such pig shall not be moved from the 1arket except with the permission of the authorised person.

9. *Limit of Weight.*—(*a*) No person shall sell or buy or offer to sell ›r buy for slaughter or shall slaughter any pig weighing at the time of ale or offer for sale or at the time of slaughter less than 112 lb. live ·eight.

(*b*) This Clause shall not apply to any sale or purchase for slaughter f a pig weighing less than 112 lb. weight, where slaughter is for any xceptional reason or purpose authorised by the Live Stock Commisioner or his representatives or by an officer of the Board of Agriculture nd Fisheries or the Board of Agriculture for Scotland.

10. *Increasing Weight of Pigs.*—(*a*) A person shall not feed or water r otherwise treat any pig so as unduly to increase its weight at the time f sale.

(*b*) Where a Government Buyer has reasonable cause to suspect hat a pig has been fed or watered or otherwise treated so as to unduly ncrease its weight at the time of sale, he may detain such pig for such ime as he thinks fit before ascertaining its weight for the purposes of ale under the provisions of this Order.

11. *Prescribing Markets.*—(*a*) The Food Controller may at any time ›rescribe the market or markets in which any pigs shall be sold for laughter, and no person shall thereafter send or cause to be sent such ›igs for sale for slaughter to, or sell for slaughter such pigs in, any narket other than such prescribed market or markets.

(*b*) A person shall not move any pigs fit for slaughter from one area o any other area without the permission of the Food Controller; pro-'ided that pigs fit for slaughter may be moved from one area to any ·ther area without such permission—

(i.) if the lands and premises on which such pigs are ordinarily kept by the owner lie within more than one area and such pigs are moved only from one part of such lands and premises to another in the ordinary course; or

(ii.) if the owner of such pigs occupies other lands and premises situate in an area other than the area in which the pigs are ordinarily kept and the pigs in question are moved to such lands and premises, provided that in this case notice of such removal shall within 7 days thereof be given in writing to the Live Stock Commissioner for one or other of such areas.

12. *Records.*—Every person who in the course of his business buys .ny pigs for the purpose of his business shall keep accurate records howing the prices paid for such pigs and such other particulars as are 'ecessary to show whether or not the provisions of this Order are being omplied with, and shall make such returns as to his business as the 'ood Controller or a Food Committee may from time to time require. ill such records and relevant documents shall be open to the inspection f any person authorised by the Food Controller or a Food Committee.

13. *Entry and Inspection.*—For the purpose of executing and enforcing this Order any officer of, or other person authorised by the Food Controller may enter into any slaughterhouse or other premises on which he suspects pigs are being or have been slaughtered and examine any animals or carcasses therein, and inspect and require production of any books or other documents relating to pigs slaughtered on such premises; and no person shall impede or obstruct such officer or other person in the exercise of his powers under this Clause.

14. *Fictitious Transactions.*—A person shall not sell or offer or expose for sale or buy or agree to buy any pigs at a price exceeding the price applicable under this Order, or in connection with the sale or disposition or proposed sale or disposition of any pig enter or offer to enter into any artificial or fictitious transaction or make or demand any unreasonable charge.

15. *Infringements.*—Infringements of this Order are summary offences against the Defence of the Realm Regulations.

16. The Pigs (Prices) Order, 1918,* is revoked as regards England and Wales and Scotland, but without prejudice to any proceeding in respect of any contravention thereof.

17. *Interpretation.*—For the purposes of this Order "Pig" shall include boar and sow; "Score" shall mean a weight of 20 lb.; "Market" shall include market, fair, or such other place as the Food Controller shall from time to time authorise as a market for the purpose of this Order.

"Dressed Carcass" means the carcass of the pig without the offal and shall include the whole of the flair or leaf, the head, kidneys, skirtings, feet and skin. The carcass shall not be trimmed at the throat, ears and nose, except by the removal of the hair.

"Offals" includes plucks, chitterlings, liver, intestines, loose fats, hearts and lights.

"Self-supplier" means the owner of a pig at the time of slaughter who has owned it for not less than two calendar months immediately preceding the slaughter thereof and who is in possession of the land or premises where the pig has been kept during such period.

"Small Owner" means a person who sells for slaughter in any calendar year not more than three pigs owned by him.

A pig shall be deemed to have been bought or sold for slaughter if it be slaughtered within 14 days of the sale.

"Area" means in England and Wales the district of a Live Stock Commissioner, and in Scotland the district of a Deputy Live Stock Commissioner.

18. *Title and Extent.*—(*a*) This Order may be cited as the Pigs (Sales) Order, 1918.

(*b*) This Order shall not extend to Ireland.

The Calves (Sales) Order.

THE Calves (Sales) Order, 1918 (No. 1036), dated 21st August, 1918, made by the Food Controller, introduced, as from 26th August, a new system of control in regard to the sale and slaughter of calves. The Order places no restriction upon the sale of live calves, but a calf may be slaughtered only at a Government slaughter-house except in cases where slaughter elsewhere—for example, on a farm—is

authorised by the Food Controller. Calves brought to a Government slaughter-house will be bought by a Government buyer, and calves slaughtered elsewhere than at a Government slaughter-house, if intended for human consumption, must be sold only to a Government buyer. The addresses of Government slaughter-houses will be advertised in local newspapers.

Proposed Rise in the Price of Meat: The Farmer's Position.

IN order that farmers and stock-breeders may have no doubts as to their position in the face of the probable rise in the price of meat, the Ministry of Food announce that there will be no corresponding increase in the price payable to the farmer. The proposed increase is mainly due to the rise in the cost of imported meat and *partly to the need of spreading over the whole year the increased prices to be paid to the farmer during the winter months.* In the middle of May the Ministry of Food announced that the prices of cattle and sheep would be increased on a graduated scale in accordance with the following schedule and there is no intention of modifying this arrangement :—

—	Cattle per Live Weight.	Sheep per Head.
November, 1918	Nil.	1*s*.
December, 1918	1*s*.	2*s*.
January, 1919	3*s*.	3*s*.
February, 1919	4*s*.	4*s*.
March, April, May, 1919	5*s*.	5*s*.
June, 1919	5*s*.	3*s*.
July, August, September, October ..	Nil.	Nil.

Excessive Slaughtering of Animals.

A SERIOUS feature of the meat situation is presented by the Area Live Stock Commissioners, who report from many areas a considerable increase in the number of animals passing through the markets for slaughter. The farmer, now that harvest operations are over, is better provided with the labour necessary for forwarding stock, and fears the difficulty of feeding cattle during the winter, when the accustomed provision of concentrated food is uncertain and he must rely mainly on roots and home-grown food. Though the Ministry of Food fully realise the difficulty in which the farmer is placed, and are carefully reviewing the situation so that fodder requirements may as far as possible be met, they are bound to consider the position which may arise if cattle are slaughtered too freely early in the autumn.

Home-grown meat has assumed a greater importance than ever, since a further limitation on imports is imposed by the necessities of military transport, and it is therefore essential that stock should be conserved during the winter months. Accordingly the Food Controller has decided to reduce consumption by a general lowering of the ration, and simultaneously instructions have been issued to Government agents in the markets to secure that only cattle really finished shall be

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that conservation of the herds is a matter of urgent national interest, and will avoid premature slaughter of their stock. (*National Food Journal*, 25th September, 1918.)

Feeding Stuffs for Stocks: Detail of Arrangements for the Winter.

THE uncertainties attending the supply of feeding stuffs are responsible in some degree for the large numbers of cattle brought to market in the last few weeks, though the break in the weather and the comparative leisure following harvest have also influenced the situation.

Since Area Live Stock Commissioners are responsible generally for the maintenance of the herds of the country, and are in possession of detailed information with regard to stock on the farms, it has been decided to increase their responsibilities in respect of feeding stuffs distribution. They have been hitherto entrusted with the issue of priority certificates for feeding stuffs. In future a Feeding-Stuffs Sub-Commissioner will be attached to the staff of each Area Live Stock Commissioner, and applications from farmers will be dealt with at the Commissioner's office.

Dairy cattle in milk, calves under six months, bulls over six months kept for breeding, and horses engaged in agricultural work, sows in farrow, boars and store pigs will be strictly rationed as regards concentrated feeding stuffs. An extra ration is to be granted, under certain conditions, to stall-fed dairy cattle. The Live Stock Commissioners will issue certificates entitling the holders to purchase supplies, on a rationed basis, of cakes and meals, millers' offals and brewers' grain. Farmers will be tied to licensed dealers nominated by them—either to a separate dealer for each class of feeding stuff, or to a single dealer for two or more varieties.

At present it is not proposed to take into account the farmer's own supplies of oats, barley, roots, beans, and peas, though information under this head will have to be scheduled in case the situation should become so critical as to make it essential that farmers' home-grown supplies should be considered. It is proposed that farmers obtaining licences to feed tail and damaged grain shall have their allotments of cake reduced ton for ton.

At headquarters a Feeding-Stuffs Board has been set up, together with a main Allocation Committee composed of representatives of the Feeding Stuffs and Live Stock Sections of the Ministry of Food, together with representatives of the Boards of Agriculture and of the trades concerned, working in conjunction with the Joint Official Committee of the Board of Agriculture and the Food Ministry. Supplies will be allocated to each area in accordance with its ascertained needs, and will be allotted *pro rata* to dealers according to the certificates registered with them for delivery to farmers. It is proposed to decentralise as much of the work as possible to county officers working under the Sub-Commissioner for Feeding Stuffs in each county. These county officers will be, whenever possible, the existing secretaries of the Provincial Feeding Stuffs Committees.

The necessary machinery is being set up at once, and it is felt that the new procedure, if patriotically backed by the trade, will give the farmer the fair treatment he is entitled to expect, and help to conserve the nation's supplies. (*National Food Journal*, 9th October, 1918.)

Short Supply of Feeding Stuffs: Notice to Stock Owners, Licensed Dealers, and Others.

IN view of the imperative necessity for reserving as much of total tonnage as possible for the transport of American troops and of their munitions and supplies, it is inevitable that during the coming winter feeding stuffs should be in short supply. The Ministry propose, however, to secure that such feeding stuffs as are available shall be fairly distributed among those requiring them, and that an effective preference shall be given to the more important classes of live stock, and especially to milch cows.

The scheme proposed will come into full operation on 17th November. After that date feeding stuffs will be distributed only to persons who have made applications in accordance with the scheme, and on the basis of a definite allowance per head for the various classes of live stock.* The application forms are as follows :—

Form L.F.S. 1 : For dairy cattle, calves, breeding bulls, agricultural horses, and pigs other than those owned by "small owners" and pig clubs.

Form L.F.S. 2 : For horses not engaged in agricultural work (*e.g.*, horses nsed for trade purposes and pit-ponies).

Form L.F.S. 3 : For use by pig clubs.

Form L.F.S. 4 : For use by small owners who slaughter 3 pigs or less in one year and who are not members of pig clubs.

Copies of Forms L.F.S. 1, L.F.S. 2 and L.F.S. 4 should now be obtainable from licensed dealers in cattle feeding stuffs. The first two (L.F.S. 1 and L.F.S. 2) must be returned to the Live Stock Commissioner by 15th October.† The other (L.F.S. 4) must be returned by the same date to the dealer from whom the smaller owner of pigs wishes to purchase supplies.

Copies of Form L.F.S. 3 will be obtainable by secretaries of pig clubs from the Live Stock Commissioner, and must be returned to him. Members of pig clubs should apply to their secretaries. Any licensed dealer who does not receive the application form by Wednesday, 9th October (to-day), should apply for a supply to the Area Live Stock Commissioner for his area.

For the reasons stated, there is a very great scarcity of concentrated animal feeding stuffs ; and persons who can manage without purchasing supplies, or who can manage with less than the maximum allowances, will be doing the country a service by refraining from making application, or by applying for reduced quantities. Every pound of concentrated feeding stuffs that can be saved is urgently required for providing for other classes of cattle.

Pending the setting up of the new organisation, arrangements are being made for supplies for cows in milk, calves under six months, agricultural horses, sows in farrow, store pigs and pit ponies. Owners should apply to their usual dealers for the proper forms on which to make application during this emergency period. Form C.F.S.E. 1 is required for supplies for animals for which priority certificates have been issued ; C.F.S.E. 3 for the same classes of animals for which no certificates have yet been obtained. (*National Food Journal*, 9th October, 1918.)

Regulation of the Sale of Hay and Straw and of Chopped Hay and Straw in England and Wales.*

AN Army Council Order, dated 20th August, 1918, as amended by a subsequent Order, dated 27th August, 1918, fixes the following maximum prices for hay and straw in the stack:—

Hay, per ton, £8.

Threshed hay, per ton, £5.

Oat straw, barley straw, pea straw, and threshed tares, per ton, £3 15s.

Wheat straw, rivett wheat straw, buckwheat straw, and mustard straw, per ton, £3.

For 1917 or earlier crops the following are the maximum prices:—

Hay, per ton, £6 1s.

Threshed hay, per ton £4 10s.

Oat straw, barley straw, bean straw, pea straw, and threshed tares, per ton, £3 6s.

Wheat straw, rivett wheat straw, buckwheat straw, and mustard straw, per ton, £2 15s.

The above prices in each case are for the best quality only; inferior hay or straw will be graded according to quality. The prices in every case must include the cost of carting to the nearest railway station, or a distance equivalent thereto. Interest at the rate of 5 per cent. or 10 per cent. is added in certain cases.

All hay and straw sold for civilian purposes, whether to a wholesale dealer or retailer, will be invoiced to such wholesale dealer or retailer by the County Distributing (Forage) Committee of the County concerned at cost price at stack, plus buying and establishment charges.

The wholesale dealer may add the following charges:—

(*a*) For establishment charges, 5s. per ton.

(*b*) For cutting, trussing, and tying with string or baling with two or more wires, 16s. per ton.

(*c*) (1) The actual cost per ton incurred on any freight by rail, or (2) the actual cost of freight by water not exceeding such sum per ton per mile as the County Distributing (Forage) Committee is satisfied is the local rate ruling at the time of delivery; (3) where conveyed wholly by road and not by rail or water, such sum per ton per mile in excess of the distance from stack to nearest railway station as the County Distributing (Forage) Committee is satisfied is the local rate ruling at the time of delivery.

(*d*) Where conveyed by rail or water, for loss of weight in transit, 5s. per ton.

(*e*) In the case of straw tied by hand in bundles with two strings or bands, instead of the sum mentioned in (*b*) above the sum of 14s. per ton.

(*f*) In the case of hay tied with hay or straw bands, instead of the sum mentioned in (*b*) above the sum of 10s. per ton.

(*g*) In the case of straw baled or bundled, with two or more wires or strings behind the threshing drum, instead of the sum mentioned in (*b*) above the sum of 10s. per ton.

* A Leaflet (No. 12) dealing with the situation as to hay and straw from the farmer's standpoint has been issued by the Joint Committee of the Board of Agriculture and the Ministry of Food. Copies may be obtained post free on application to the Secretary, Joint Committee, 6A, Dean's Yard, Westminster,

In addition to the above sums per ton a wholesale dealer who is also a distributor, or a distributing dealer or producer distributor, may add the following charges :—

(*a*) For establishment charges and profit, 6*s*. per ton.

(*b*) For road delivery charges from store or railhead to consumer's premises, such sum per ton per mile as the County Distributing (Forage) Committee is satisfied is the local rate ruling at the time of delivery.

(*c*) All costs of storage by County Distributing (Forage) Committee.

(*d*) All costs of storage on premises occupied by dealers, at rates approved by the County Distributing (Forage) Committee of the County in which such premises are situate. The price of rye straw shall be the same as the price of oat straw.

Manufacturers of chopped hay and straw may make an additional charge of £2 3*s*. 4*d*. per ton to cover all costs incidental to manufacture; provided that where the consumer or purchaser supplies his own bags such charges shall be £1 10*s*. per ton.

Distributors may charge for quantities not exceeding 10 cwt. an additional sum of £1 6*s*. 8*d*. per ton, and provision is made for cases in which orders for more than 10 cwt. cannot be fulfilled in one delivery.

New Hay and Straw Order.

THE Controller of Horse Transport calls the attention of owners and users of horses to the revised Hay and Straw Order (No. 3, 1918), dated 25th September, 1918, issued by the Board of Trade, which came into operation on the 1st October. Under the previous Order maximum daily rations of chaff were laid down for various classes of horses, the Order providing that chaff shall consist of not less than one-third of straw. Under the new Order the maximum rations in hay are prescribed, leaving horse owners to add as much straw-chaff as they desire. The principal rations are as under :—

Heavy dray and cart horses and heavy trotting vanners	13 lb. of hay per day.
Light dray and cart horses and light trotting vanners	10 " "
Other light horses and cobs	8 " "
Ponies 14 hands and under	7 " "

The increased production of straw this year also permits of the withdrawal of the prohibition against the use of straw for bedding horses except in the case of oat-straw, which must be kept for feeding purposes.

The increased demands upon the hay crop of the country through the shortage of other animal feeding-stuffs, and the calls of the Army, render it essential that the utmost economy should be exercised in the consumption of hay. Horse owners are therefore urged to make use of straw, roots, and other substitutes as far as they can do so consistently with the maintenance of the health and efficiency of their horses.

Correspondence with respect to the Order should be addressed to

THE following Notice was issued by the Food Production Depart ment of the Board towards the end of September :—

Hay and Straw.

There appears to be some doubt amon farmers as to their position with regard t their hay and straw. The Food Productio Department therefore circulate the following statement: Stocks c hay and straw are nominally at the disposal of the Army Council an all farmers will be visited in due course by officers of the Forage De partment, who will note what hay and straw is not required for use o the farm. These officers have been instructed to release liberally but if any farmer is dissatisfied with the quantity released he ca appeal to the Farm Produce County Committee, whose decision as t what he can retain will be final. This Committee is composed of farmer Pending an inspection and the issue of a licence, a farmer may continu the reasonable use of his hay or straw for his stock.

There is, therefore, no reason to fear that farmers will not be le with sufficient hay or straw for their stock, but it is desirable tha they should exercise the greatest possible economy in the use of hay and they should to as large an extent as possible use straw instead o hay for feeding purposes.

THE following Notice was issued by the Food Production Depart ment of the Board towards the end of September :—

Hay for Rabbits.—It is not necessary to use any sort of corn or mea for rabbits during winter, although it may be desirable to give breedin stock a little bran. Roughly, a rabbit needs daily food equal to abou one-eighth of its own live weight. In winter a 6-lb. rabbit would nee 10 oz. of green food or roots and 2 oz. of hay. Rabbit-keepers wil be interested to learn that the Central Council of the Forage Depart ment Civil Supplies allows 1 lb. of hay per week per rabbit—slightl above the actual requirement for a rabbit of medium size—and tha this quantity can be obtained by consumers registered with an licensed dealer. The National Utility Rabbit Association is informe that farmers in various places have refused to sell hay to rabbit-keeper because they were not clear as to the regulations on the subject. Th Association has, therefore, obtained this ruling from the Centra Council.

ANY owner of dairy cows, breeding sows, or young pigs who has not already applied to the Live Stock Commissioner of his area for a

Millers' Offals: Priority Certificates.

priority certificate entitling him to millers offals should at once do so. Up to the present time a very large percentage of such offals has undoubtedly been distributed to persons not possessing priority certificates; but the Ministry is tightening control of these feeding-stuffs, and millers are served with a notice that they are to supply offals only to certificate holders, unless and until these have received the quantities to which their certificates entitle them. This emergency measure should go a long way to assure stock-owners that, however limited the quantity of offals may be they will receive their share. A Rationing Order is being prepared for every class of stock, but the completion of this Order must wait until the amount of tonnage to be allocated for imported feeding-stuffs by the Maritime Council is definitely known. Meanwhile, it may be well to correct a mistaken impression as to the quantity of cake stored

by the Government, which has been mentioned at as high a figure as 450,000 tons. It is rather less than 60,000 tons, of which under 20,000 tons is cotton cake.—(*National Food Journal*, 11th September, 1918.)

THE following Notice was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food towards the end of September :—

Silage : A Farmer's Solution.

In view of the interest aroused amongst farmers as to the future possibilities of silage as a permanent feature of English agriculture, the experience of one of our correspondents, as given in the following letter, should prove of value. Not the least interesting fact is that the stack system of ensiling crops adopted by him requires but little expenditure of capital. The letter is as follows :—

"I have been making silage from sewage irrigated Italian rye-grass for many years past. As a rule I commence cutting rye-grass in May and continue until the middle of June, when we try to make it into hay if the weather is favourable, but, if wet, we continue making silage. Silos are not used, but silage stacks on the Johnson's system of pressure by means of cast-iron drums on which are wound flexible wire-strand ropes passed over the rick. The rye-grass is best left with one or two days' interval, according to state of grass and weather, between cutting and stacking, so that the succulent grass may part with some of its moisture before stacking. It is best, if the amount of crops is sufficient to justify it, to have two stacks in use and load each on alternate days; then the necessary heat will be generated and it will not be necessary to put on the ropes, except to stand over Sunday, when the stacks are half-built or three-parts, or much heat generated. The wire ropes should be put on and tightened twice daily until the stacking is resumed. The grass is not chaffed, of course, and is fed in winter to young cattle, in-calf heifers and cows and horses, all of which eat it readily. It is more important the stacks or silos should be most convenient and near to the fields in which the crops for silage are proposed to be grown, as the haulage of this heavy crop for silage is a big consideration at a busy time of the year.

"P.S.—The silage can readily be hauled to the stock in the winter when work is not so pressing, and in case sour silage is made it is best some distance from dwelling-houses. I prefer sweet silage, though live stock will eat either equally well. Another advantage is, it is not affected with frost, and will keep good for two or more years."

THE following Notice was issued by the Food Production Department of the Board in September :—

Bracken for Litter.

In view of the present restrictions on the use and sale of straw, it is hoped that owners of land on which bracken is grown, who do not require the bracken for their own use, and conservators of commons, will offer every facility in their power for the removal of bracken by those who require litter for their stock.

In cases where grubbing up is resorted to, it should be remembered that the roots are readily eaten by pigs. A leaflet on Bracken as Litter can be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, S.W. 1.

THE *following Notice was issued* by the Food Production Department of the Board towards the end of September :—

Gorse for Feeding. The practice of using young shoots of gorse for the feeding of cattle and horses was at one time common in many parts of this country. It is still followed in some districts, and might, under present circumstances, be considerably extended. Gorse is in many ways an excellent winter food for certain classes of stock, and might be largely made use of with straw, of which there will be much more than usual to consume during the coming winter. Generally gorse is used from October to the beginning of the New Year. The usual method is to cut daily what is required for use, and then to pass the gorse through a gorse-chopper, or even an ordinary chaff-cutter. After this it is mixed with chopped straw roughly in the proportion of from one-third to one-half by bulk. Special gorse-choppers are often used in places where gorse is regularly fed, but an old-fashioned chaff-cutter, with slanting knives fixed on a drum (which is the principle on which gorse-choppers are made) will answer the purpose well. An ordinary strong chaff-cutter, if set to cut short, will also serve. Gorse is not generally considered useful for young stock, but is certainly of great value for horses, and especially cows.

AN Order (No. 1165), dated 17th September, 1918, has been made by the Food Controller to the effect that :—

The Milk (Winter Prices) Order, 1918. 1. No person shall directly or indirectly sell or offer for sale or buy or offer to buy any milk at prices exceeding the maximum prices provided by or in pursuance of this Order.

2. Until otherwise determined pursuant to this Order the maximum price applicable on the occasion of a retail sale of milk shall be :

(*a*) For milk delivered on and after the 1st October up to and including the 21st November, 1918, at the rate of 3*s.* per imperial gallon, for milk delivered on and after the 22nd November, 1918, up to and including the 30th April, 1918, at the rate of 3*s.* 4*d.* per imperial gallon.

(*b*) Where at the request of the buyer the milk is required to be delivered in bottles and is so delivered to the buyer's premises an addition may be made to the foregoing prices at the rate of 1*d.* per quart, provided the milk is bottled under proper sanitary conditions at or before reaching the seller's premises.

(*c*) The foregoing prices shall include all charges for delivery, but it shall be permissible for a Food Committee for any area, from time to time subject to the provisions of this Order, by resolution to fix for all or any of the milk sold within their area and not delivered to the purchaser's premises a rate different from the rate for the time being applicable to milk which is so delivered, provided that no such resolution shall have effect until sanctioned by the Food Controller.

3. (*a*) Where milk is sold wholesale by or on behalf of the producer he maximum price chargeable for milk delivered on and after the 1st October, 1918, up to and including the 30th April, 1919, shall be at the ate of 2*s.* 3*d.* per imperial gallon, together with a sum equal to the et amount of the charges for railway transport actually incurred by he seller.

(*b*) The rate applicable under Sub-clause (*a*) of this Clause is fixed on the basis that the milk is delivered at the seller's expense to the buyer's premises or (at the option of the seller) to the buyer's railway station, and that in the latter case all charges for transport beyond the buyer's railway station are borne by the buyer. Where milk is not sold on this basis a corresponding adjustment shall be made in the rate, and for this purpose the cost of delivery to the buyer's premises or carriage to the seller's railway station shall be reckoned at a sum not less than ½*d.* per gallon.

(*c*) No additional charges may be made for the provision of churns or other vessels.

4. Where milk is sold wholesale by or on behalf of any person other than the producer the maximum prices chargeable shall, until otherwise determined pursuant to this Order, be as follows :

(*a*) In the case of milk delivered by the producer to or for the account of the buyer in accordance with the directions of the seller the rate shall, until the end of April, 1919, be ½*d.* per imperial gallon higher than the price chargeable to the seller by the producer.

(*b*) In the case of milk not so delivered, the rate shall be—

(i.) When delivery is made by the seller to the buyer's railway station 2*s.* 5*d.* per imperial gallon, together with the railway charges paid by the seller for carriage from the seller's station to the buyer's station.

(ii.) When delivery is made by the seller to the buyer's premises at the rate of 2*s.* 7½*d.* per imperial gallon.

(*c*) The rates mentioned in Sub-clause (*b*) are fixed upon the basis that the cost of providing churns or other vessels is borne by the seller; and where milk is not sold on this basis, then the rate shall be ascertained by deducting from the rate applicable under such Sub-clause the sum of ¼*d.* per imperial gallon.

(*d*) Except in the cases to which Sub-clause (*a*) of this Clause applies no milk shall be sold wholesale by or on behalf of a person other than the producer of the milk sold except upon the terms that the milk is to be delivered by or at the expense of the seller to the buyer's premises or the buyer's railway station.

5. A Food Committee may, from time to time by resolution passed at any time after the date of this Order, vary the maximum price applicable on a retail sale for milk delivered within their area or any part of such area but :

(*a*) Every such resolution shall be reported to the Food Controller within five days and shall not take effect until three days after the same has been sanctioned by the Food Controller, and

(*b*) Every resolution of a Food Committee under this Clause shall be subject at any time to review by the Food Controller and shall be withdrawn or varied as he may direct.

6. (*a*) Where milk is sold to an establishment as herein defined by any person (whether he be the producer of the milk sold or not) in a quantity of not less than 17 imperial gallons to be delivered in any one day the maximum price (including charges for delivery to the buyer's premises) shall be, whichever shall be the lower of the following prices, namely :

(i.) 2*d*. per imperial gallon higher than the maximum price chargeable in the district in which the establishment is situate for milk delivered to the buyer's premises on a sale by wholesale by a person other than a producer; or

(ii.) the maximum retail price for the time being in force in such district.

(*b*) Any other sale to an establishment shall for the purposes of this Order be deemed to be a retail sale, and the maximum price shall be determined accordingly.

(*c*) "An establishment" for the purposes of this Order shall mean a public or private hospital, sanatorium, convalescent or nursing home, workhouse, infirmary, asylum, corporation or company not established for purposes of trading or profit, a religious or charitable community, a residential school or college, and a canteen.

(*d*) A Food Committee shall have power with the consent of the Food Controller—

(i.) to apply the provisions of this Clause, whether with or without modifications, to a sale of milk to any body of persons which, in the opinion of the Committee, should be treated as an establishment;

(ii.) to vary the provisions of this Clause in its application to any establishment.

7. Where a person who sells milk from a retail shop sells from such shop milk to a person buying for re-sale, the maximum price shall, as to the milk sold on any day, be 2*d*. per gallon less than the maximum price applicable to sales of milk by retail in the area in which such shop is situate, if the quantity sold on that day to such person does not exceed 8 imperial gallons.

8. No milk shall be sold or offered for sale by retail otherwise than by imperial measure, except that nothing in this Clause shall prevent:

(*a*) Sales of milk by the pennyworth or two pennyworth; or

(*b*) Sales of any fraction of a gill, pint, quart, or gallon of milk;

Provided that the maximum price is not exceeded.

9. No colouring matter shall be added to milk or cream intended for sale, and no milk or cream to which any colouring matter has been added shall knowingly be sold, or offered or exposed for sale.

10. No water shall be added to milk intended for sale, and no milk to which any water has been added shall knowingly be sold, or offered or exposed for sale.

11. No person may use for the purpose of his trade or business any milk-can, milk-churn or milk-bottle which bears the name or trade name or the trade mark or trade device of some person other than himself or his employer, except with the consent of such person.

12. No person shall, in connection with the sale or disposition or proposed sale or disposition of any milk, enter or offer to enter into any fictitious or artificial transaction or make or demand any unreasonable charge.

13. A Food Committee may, subject to the consent of the Food Controller—

(*a*) buy milk from any person and sell milk so bought at a price estimated to cover at least the cost of purchasing and distributing such milk; and

(*b*) make arrangements as to the distribution of milk in their area.

14. (*a*) A Food Committee may—

(i.) direct any person delivering milk by retail in their area to deliver such milk to any consumer or class of consumers in priority to any other person in their area ; and

(ii.) direct any person selling milk by retail within their area to deliver in that area only within such parts thereof as the Committee may prescribe ; and

(iii.) with the consent of the Food Controller give directions in their area for securing the purity, cleanliness and wholesomeness of milk, provided that any directions so given shall not relieve local authorities of their powers and duties under existing statutory provisions in regard to milk or relieve cow-keepers, dairymen, purveyors of milk or occupiers of milk shops from their obligations under any such provisions.

(*b*) Every person to whom any direction is given under the powers conferred by this Clause shall comply with such directions.

(*c*) A Food Committee may, with the consent of the Food Controller, exercise the powers conferred by Sub-clause (*a*) (i.) of this Clause in respect of condensed milk, dried milk and milk preparations.

15. A Food Committee shall not, without the consent of the local authority or authorities by whom they were appointed, exercise the powers conferred upon them by the two immediately preceding Clauses in such manner as may involve an expense which is ultimately to be borne by such authority or authorities, provided that the validity of any direction given by a Food Committee under any such powers shall not be questionable on the ground that such consent has not been obtained.

16. Where any contract subsisting on the 1st October, 1918, for the sale of milk provides for the payment of a price in excess of the maximum price fixed by this Order applicable on the occasion of such a sale, the contract, unless otherwise determined by the Food Controller, shall be avoided so far as concerns milk which is to be delivered on or after that date.

17. (*a*) The provisions of this Order relating to prices shall not apply to milk sold for consumption on the premises of the seller :

(*b*) Except as provided by Clause 14, nothing in this Order shall apply to condensed milk, dried milk or milk preparations.

18. For the purpose of this Order :

"Food Committee" shall mean a Committee appointed in pursuance of the Food Control Committees (Constitution) Order, 1917.

"Buyer's Premises" shall not include any roadside collecting place for milk or any other premises which the Food Controller shall in any particular case determine not to be buyer's premises for the purposes of this Order.

"Buyer's Railway Station" shall mean the railway station to which in the ordinary course of business the milk would be consigned by the seller to the buyer or, in cases to which Clause 4 (*a*) applies, to the buyer's purchaser.

19. The Milk (Summer Prices) Order 1918,* and the general licence granted thereunder and the Milk (Summer Prices) Amendment Order, 1918,† are hereby revoked as on the date when this Order comes into force, but without prejudice to any proceedings in respect of any previous contravention thereof

Note.—This Order came into force on the 1st October, 1918, and does not extend to Ireland.

AN Order (No. 1232), dated 30th September, 1918, has been made by the Food Controller to the effect that :—

Order Amending the Milk (Winter Prices) Order, 1918.

1. Sub-clause 4 (*b*) (ii.) of the Principal Order‡ shall be deleted and the following Sub-clause shall be substituted therefor :—

(ii.) Where delivery is made by the seller to the buyer's premises a rate in accordance with the following table :—

Period of Delivery.	*Rate per Imperial Gal.* s.	d.
After the 30th September, 1918, and before the 8th October, 1918	2	7½
After the 7th October, 1918, and before the 22nd November, 1918	2	6
After the 21st November, 1918, and before the 17th December, 1918	2	7½
After the 16th December, 1918, and before the 1st May, 1919	2	8

AN Order (No. 1246), dated 5th October, 1918, has been made by the Food Controller, providing that the Food Controller or any person authorised by him in that behalf may from time to time issue directions relating to the collection, allocation, distribution or treatment of milk, and in particular may—

The Milk (Distribution) Order, 1918.

(i.) fix the proportion or amount of milk which may be retained by a producer for the purpose of his wholesale or retail trade, or for any other purpose ;

(ii.) fix the maximum quantity of milk which may be acquired by any person in any period and the persons from whom milk may be acquired by him ;

(iii.) direct that any producer or dealer in milk shall sell or deliver the whole or any part of his milk to any person or place ;

(iv.) restrict or regulate the sale or delivery of milk by any person to any other person or to any place ; and

(v.) fix the maximum amount of liquid milk which any person may use in any period for any manufacturing purpose.

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* Printed in this *Journal*, April, 1918, p. 110.
† Printed in this *Journal*, July, 1918, p. 491.
‡ See p. 894.

Winter Milk.

THE Food Council have had under consideration the supply and distribution of milk during the coming winter, and the Food Controller, on their advice, has decided to give immediate effect to recommendations made to him by the Sub-Committee of the Astor Committee which reported earlier in the year.* With this end in view, Orders have been made giving the Food Controller the necessary powers to direct producers and traders as to the disposal of liquid milk, whether for the purposes of manufacturing cheese, butter, condensed milk, and other milk products, or for direct consumption as liquid milk.

The first of these Orders,† the Milk (Distribution) Order, 1918, enables the Ministry of Food to give the necessary instructions to producers and dealers with regard to the person or persons to whom the milk shall be delivered, etc., and the purposes for which it may be used. The second Order‡ provides for the taking over, under Clause 2GG of the Defence of the Realm Regulations, of the premises of milk factories and milk wholesalers. These Orders do not apply to Ireland.

The issue of these Orders does not involve any immediate alteration in the present channels of distribution, and those concerned are being instructed to proceed as usual until definite instructions are received. In the meantime, Assistant Milk Commissioners are being appointed in each division to act under the instructions of the Food Commissioners.

These officers will survey the situation as regards production and requirements in their areas, and will thus be able to advise the Ministry of the measures that are necessary to secure the preservation of supplies, the prevention of waste and a fair distribution to consumers.

The Ministry of Food will have the advice of a Central Advisory Milk Committee on which consumers, dairy farmers, the wholesale trade, and retail organisations, together with the Government Departments concerned, will be represented. Steps are under consideration for a measure of devolution for Scotland. (*National Food Journal*, 9th October, 1918.)

The Eggs (Licensing of Wholesale Dealers and Distribution) Order, 1918.

AN Order (No. 1140), dated 13th September, 1918, made by the Food Controller, prescribes as follows :—

A person shall not deal in eggs by wholesale either on his own account or as agent on commission :—

(*a*) After the 28th September, 1918, unless he has applied for a licence as a wholesale dealer in eggs ; or

(*b*) after the 2nd November, 1918, unless he is the holder of a licence for the time being in force granted by the Food Controller authorising him to deal in eggs by wholesale.

Every application for a licence shall be made to the Secretary, Ministry of Food (Eggs Supplies Branch), 100, Cromwell Road, S.W. 7, on the form appropriate to such application.

Nothing in the Order shall apply to (*a*) a person selling eggs laid by his own birds ; (*b*) eggs for breeding purposes ; or (*c*) canned, dried or desiccated eggs or egg products.

The Order does not apply to Ireland.

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* See this *Journal*, July, 1918, p. 452. † Printed above, p. 898.
‡ Order, No. 1245, dated 5th October, 1918. Not printed in this *Journal*.

Supply of Eggs.

THE Ministry of Food have had under consideration for some tim past the question of the egg supply during the coming winter. Thei arrangements have progressed so far and s successfully that, in spite of the enhance difficulties in the way of securing poultry fooc transport, and distribution, the public are already practically assure of a supply at any rate equal to last winter's, and at prices which wi not by any means reach the fabulous sums that rumour has inventec The first step in the Ministry's policy was to ensure that a reasonabl price should be asked of the consumer, whose interests it is the primar duty of the Food Controller to protect. Next it was necessary to arrang a clear definition between grades of eggs—fresh, imported, and preservec Thirdly, there was the problem of methods of distribution. On th latter point it may be observed that existing channels will not be inter fered with to any greater degree than is necessary, in order to secur equality for all, the big towns in industrial districts will have thei supplies on a parity with home-producing rural districts.

In regard to quality, the responsible officials now have before then the possibility of instituting three grades, which may be stated tentativel as (1) eggs other than imported and preserved eggs weighing over 1⅞ oz. (2) imported and preserved eggs over that weight; and (3) all eggs les than that weight, with a form of schedule which can be varied from tim to time. A decision will be reached almost immediately as to whethe some such system of grading is practicable. In the matter of price—th question which most nearly affects the consumer—arrangements hav been made whereby at least 50 per cent. of the egg supply in the winte months will become the property of the Ministry. These eggs will com from Ireland, Egypt, Denmark, Canada, and America. Although a the present moment the price at which they will reach the breakfas table cannot be stated, they will be comparatively cheap, according to their quality. The remainder of the country's supplies will be brough into line under an Order of the Food Controller to be issued in du course. (*National Food Journal*, 11th September, 1918.)

Order Amending the Poultry and Game (Prices) Order, 1918.

AN Order (No. 1084), dated 30th August, 1918, has been made b the Food Controller to the effect that :—

The Poultry and Game (Prices) Order, 1918* (hereinafter called the Principal Order), shal be amended as follows :—

1. The Schedule to this Order shall on an after the 30th August, 1918, until further notice be substituted for th Schedule to the Principal Order.

2. After Sub-clause (iv.) of Clause 4 of the Principal Order ther shall be inserted the following Sub-clause :

"(v.) A person may sell poultry or game otherwise than by weigh provided that the maximum price is not exceeded, and pro vided he weighs the poultry or game at the time of sale if s *required by the buyer.*"

3 After Clause 11 of the Principal Order there shall be inserted th following Clause :

"11A. Nothing in this Order shall apply to sales of cooked poultr or game by a caterer in the ordinary course of his caterin business."

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* Printed in this *Journal*, August, 1918, p. 600.

THE SCHEDULE.

Maximum Prices for Poultry and Game.

—	First Column.		Second Column.	
	Price at the Rate per lb.	Price for the Bird.	Price at the Rate per lb.	Price for the Bird.
	s. d.	*s. d.*	*s. d.*	*s. d.*
Cockerel, Pullet, Cock or Hen—				
Weighing 6 lb. or less .. per lb.	2 2	—	2 8	—
Weighing more than 6 lb. ,,	—	13 0	—	16 0
Domestic Duck—				
Weighing 6 lb. or less .. per lb.	1 10	—	2 3	—
Weighing more than 6 lb. .. per bird	—	11 0	—	13 6
Turkey .. .. .. per lb.	2 2	—	2 8	—
Goose .. .. .. ,,	1 4	—	1 8	—
Guinea Fowl .. per bird	—	5 6	—	7 0
Grouse and Black Game, young birds (hatched in the year 1918, and sold prior to the 1st November, 1918) .. per bird	—	4 3	—	5 6
All other Grouse and Black Game per bird	—	2 6	—	3 3
Partridges, young birds (hatched in the year 1918, and sold prior to the 1st January, 1919) per bird	—	3 3	—	4 0
All other Partridges .. ,,	—	1 9	—	2 3
Pheasants (Cocks) .. .. ,,	—	5 6	—	7 0
,, (Hens) .. .. ,,	—	5 0	—	6 6

Poultry Mixtures: Procedure in Cases of Dispute.

ANY person buying poultry mixture who thinks that the ingredients include dirt, stones and worthless rubbish, or that the price is in excess of what he should be charged, can send a complaint to the proper quarter. The procedure to follow is to report the matter to the Local Food Office—not to the Ministry of Food—addressing it to the "Grain Officer" and enclosing a sample of the mixture and all the necessary particulars.

Price of Damaged Grain.

NUMEROUS statements having recently appeared in the Press announcing that farmers are able to obtain higher prices for damaged than for sound grain, the Ministry of Food consider it necessary to point out that such statements are unauthorised and contrary to facts.

The *Grain Prices Order, 1918,** clearly lays down that the maximum prices at which damaged wheat, rye, and barley may be sold are 7*s.* per qr. below the maximum prices fixed for sound wheat, rye and barley for the same period of sale; in the case of oats improperly cleaned or containing an undue quantity of soil the maximum price is 5*s.* per qr. less than the maximum for sound oats. (*National Food Journal,* 9th October, 1918.)

* See this *Journal*, September, 1918, p. 742.

THE following Notice was issued by the Food Production Department of the Board in September :—

Feeding Bees for Over-Wintering.

Owing to the unfavourable season in certain districts, many stocks of Bees are weak and very short of food.

Bee-keepers are therefore recommended to inspect their stocks immediately. Those which are weak and have less than five seams of bees should be united to form strong colonies of not less than eight seams, and all those which are short of food should have a quantity of syrup fed to them for immediate storage in the combs. This syrup can be made by dissolving each 1 lb. cake of candy in 10 oz. of water by heating over the fire.

At the present time, the manufacturers of this candy, Messrs. Jas. Pascalls, Limited, Blackfriars Road, London, S.E., are receiving large numbers of orders from bee-keepers, who are apparently ordering sufficient supplies not only for autumn feeding, but to last throughout the winter—spring. The supply of candy so far available may prove insufficient for both purposes, and as a result many bee-keepers, especially those who have nucleus stocks, may be unable to obtain any for immediate use.

This candy has been manufactured solely to supply present demands, and under these circumstances bee-keepers should obtain just now only those supplies necessary for immediate syrup feeding. The candy required for winter and spring feeding should be ordered at a later date.

Any further information on bee-keeping may be obtained free on application to the Food Production Department, 72, Victoria Street, S.W. 1.

ACCORDING to a Notice issued by the Food Production Department of the Board towards the end of September, interest in bee-keeping is stated to be reviving rapidly. This is due no doubt to the decreasing virulence of the Isle of Wight disease. This latter fact seems to be clearly established by expert inspections of apiaries in Gloucestershire, Nottinghamshire, Herefordshire, Leicestershire, Glamorganshire, and other counties made recently on behalf of the Food Production Department, which in this matter is acting in close co-operation with the British Bee-Keepers' Association. Bee-keepers will be glad to hear that experiments made during the past three years suggest the possibility of the production at an early date of a strain of bee in this country practically immune against the Isle of Wight disease. The importance of the bee to the fruit grower is more widely recognised at the present time than it has been in the past, and many inquiries have been received from growers for healthy stocks.

The Bee Outlook.

The Food Production Department have issued a timely warning to bee-keepers to pay attention to the food supply in the hives This should be augmented where necessary. Each stock brought through the winter means a considerable addition to our food supply next year in the form of both honey and fruit.

Many bee keepers have patriotically increased their colonies for distribution to those anxious to keep bees but who find a difficulty in obtaining stock. Owing to the unfavourable season in certain districts,

these nuclei and late swarms will need attention if they are to survive the winter. The Food Production Department have compiled instructions on "Building Nuclei into Strong Stocks for Over-wintering" which will be found invaluable to bee-keepers*; these instructions, and any further information on bee-keeping, may be obtained free on application to the Food Production Department, 72, Victoria Street, S.W. 1

THE following Notice was issued by the Food Production Department of the Board early in October:—

Bunt in Wheat.

It is evident from the reports which have been received from inspectors of the Food Production Department, and from the results of examining samples of seed wheat in the Seed Testing Station, that much of the wheat which will be used for seed purposes this season is contaminated with "bunt."

The presence of unbroken bnnted grains in a sample of wheat is readily recognisable, and the careful farmer either rejects it as seed wheat or takes due precautions to render the bunt harmless before sowing. These bunted grains are readily blown out during winnowing; some of the bunted grains break open and the black, powdery mass of spores they contain becomes distributed over the sound corn. If they are present in abundance the tips and the grooves of the sound grains are blackened; if they are few in number no discoloration results, and the sample appears to be bunt-free. Nevertheless, practically every grain of it may carry a few of the microscopic spores of the bunt fungus; and it is a certainty that a considerable proportion will, when sown, give rise to bunted plants.

It is often impossible to determine without a microscopic examination whether a sample intended for sowing is bunt-free or otherwise. No seed should be sown unless from previous knowledge of the crop one can be perfectly sure of its freedom from contamination, or it has been dressed with some preparation capable of killing the adherent bunt spores.

For this purpose solutions of either sulphate of copper or formaldehyde (generally known as formalin) are especially satisfactory. Various dressings used for the purpose of keeping birds and vermin away from the seed are often considered to be efficient bunt destroyers. But, in view of the fact that numbers of severe outbreaks of bunt have been seen in wheat fields sown with seed so treated, their use cannot be recommended.

The copper sulphate solution is made up by dissolving 1 lb. of sulphate of copper in 10 gal. of water: the formalin solution by pouring 1 pint of formalin into 20 gal. of water.

The heap of seed grain may be "watered" with either of these solutions and stirred repeatedly during the process to ensure the thorough wetting of every grain; or the seed may be poured into vessels containing the solution and allowed to steep for an hour or two. The latter method has the advantage that bunted grains can be skimmed off when they rise to the surface.

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* See article on p. 868.

Foot-and-Mouth Disease.

THE existence of foot-and-mouth disease amongst animals on premises at Burwash, East Sussex, was confirmed on 26th September. The usual precautions were taken to prevent the spread of the disease, and an Order was made prohibiting the movement of animals in a large area surrounding the infected farm.

Two further outbreaks have since occurred on farms practically adjoining the original infected place, one on 1st October, and the second on 9th October. Certain modifications of the restrictions on movement have been made as regards the parts of the scheduled district more remote from the infected places.

The Department of Agriculture and Technical Instruction for Ireland announced on 27th September that they had disallowed, until further notice, the landing in Ireland of all cattle, sheep, and other ruminants and swine, from Great Britain, and had, by Order taking instant effect, prohibited the landing from that country of all hay and straw, except straw used in packing merchandise, manufactured straw not intended for use as litter for animals, and hay or straw being imported for exclusively military purposes under the certificate of a competent military authority. They announced that they were also taking the customary steps to secure the disinfection on landing in Ireland of persons who have been in contact with animals in Great Britain, and that Scotland had been included in the scope of these precautions pending further information as to the extent of the outbreak.

The Government Secretary, Government Office, Isle of Man, also notified the Board on 27th September that permits for the importation into the Isle of Man from Great Britain of cattle, sheep, swine, and goats were being temporarily withheld pending further information as to there being any likelihood of the disease spreading; and an Order was issued by the Committee of Piers and Harbours, Jersey, on 28th September, prohibiting, until further notice, the landing in Jersey of cattle and hay, straw, seed and other forage from Great Britain.

Rabies.*

A CASE of rabies on a dog at Plymouth was confirmed by the Board of Agriculture and Fisheries early in September, and several other cases that are suspicious have been reported and are under investigation. In view of these circumstances, and the fact that it is known that in many instances persons have been bitten by diseased and suspected dogs, the Board have made Orders prohibiting the movement of dogs out of the counties of Devon and Cornwall, and requiring the muzzling and control of dogs within a large area of those two counties.

The Board have also made an Order empowering them to issue licences for the movement of dogs out of the Cornwall and Devon area. Such licences will require the detention and isolation of the dogs on the premises of a veterinary surgeon approved by the Board for a period of four calendar months at the expense of the owner of the dog. Applications for licences should be addressed to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, S.W. 1.

Orders have also been issued by the Department of Agriculture and Technical Instruction for Ireland, and the Isle of Man Government, temporarily prohibiting the importation of dogs from Great Britain.

The public are warned that any case in which symptoms suspicious of rabies are observed should at once be notified to the police.

* See also later note on p. 914.

"Allowances" as Part Payment of Farm Wages.

UNDER the Corn Production Act the Agricultural Wages Board, in addition to fixing minimum cash wages for agricultural workers, is empowered to define certain payments in kind —termed in the Act "benefits or advantages" —which may be reckoned in part payment of such wages. Remuneration for service in this form has been common from time immemorial in most parts of the country under the name of "allowances," "privileges," "perquisites," etc., but they have hitherto been reckoned as supplementary to the cash wage, and as additional payments regulated by custom or by special arrangements with individual workers. The establishment of a legal minimum wage, however, entitles the worker to receive the whole amount in cash, unless, by agreement with his employer, he receives part payment of the amount in one or other of the forms authorised by the Wages Board. The Board have now made an Order (see below), defining the particular "benefits and advantages" which may be legally reckoned as part payment of wages, and also determining the method in which their value for this purpose is to be ascertained. The Order lays down that where an employer supplies a worker with milk or potatoes, or provides him with a cottage or with board and lodging, he may deduct from the minimum wage in respect of these "benefits or advantages" a sum representing their cash value to the worker, as calculated in accordance with the terms of the Order. In respect of a cottage provided by an employer, the Order names the maximum amount (three shillings) which may under any circumstances be deducted from the cash wage, and under certain conditions this maximum may be reduced by the District Wages Committee for the area. Milk and potatoes are to be valued at the current producers' wholesale prices, *i.e.*, the farm price, not including cost of delivery. The value of board and lodging ("living in"), or of meals, is to be fixed in each area by the District Wages Committee, who are to have regard to current prices of commodities, and also to the amounts charged under existing contracts for employment. The decisions of the District Committees in these matters have to be reported to the Wages Board for confirmation and publication.

Customary allowances or privileges, which are not included in this Order, cannot now be reckoned in part payment of wages, although they may, of course, be continued by the employer as additions to the minimum wage, or be made the subject of mutual agreement between master and man. (*Wages Board Gazette*, 14th September, 1918.)

Order as to Benefits and Advantages which may be Reckoned as Payment of Wages in Lieu of Payment in Cash.

AN Order, dated 6th September, 1918, has been made by the Agricultural Wages Board to the following effect:—

1. The benefits or advantages which may be reckoned as payment of wages in lieu of payment in cash for the purpose of any minimum rate of wages which may be fixed under the above Act are hereby defined to include the provision by an employer for a workman employed by him of—

(1) Milk, including skimmed or separated milk.

(2) Potatoes.

(3) Lodging, except in any case in which the District Wages Committee shall determine that the lodging accommodation provided is so defective as to be injurious to health.

(4) Board, including any meals, but not including intoxicating drink.

(5) A cottage, including any garden hitherto given or let with the cottage, except where the cottage is one in regard to which the Medical Officer of Health has reported that it is in a state so dangerous or injurious to health as to be unfit for human habitation.

2. The values at which the said benefits or advantages are to be reckoned for the purpose aforesaid are hereby defined to be—

(1) In the case of milk the current producers' wholesale price (to be ascertained and determined by the District Wages Committee as hereinafter provided).

(2) In the case of potatoes the current producers' wholesale price (to be ascertained and determined by the District Wages Committee as hereinafter provided) at the time at which the main crop of potatoes is lifted.

Provided that where any payment is made by the workman for the provision of the milk or potatoes an equivalent deduction shall be made from the value at which the benefit or advantage is to be reckoned.

(3) In the case of lodging such weekly sum as the District Wages Committee shall determine.

(4) In the case of board such weekly sum as the District Wages Committee shall determine.

(5) In the case of a cottage, three shillings per week less any rent or rates which may be paid by the occupier, and so that the said value shall in no case exceed three shillings per week.

Provided that this definition of the value of the provision of a cottage shall not apply—

(a) To cottages in the area of a District Wages Committee or in any defined part thereof, when the said committee shall have determined that the average value customarily attached to cottages occupied by workmen employed in agriculture and free from defects of accommodation, repair, or sanitation (including water supply) in that area or part is less than three shillings, and in that case the value at which the provision of a cottage may be reckoned as payment of wages in lieu of payment in cash shall be such less sum as the said committee shall determine; or

(b) To a cottage with regard to which the District Wages Committee on an application by or on behalf of the workman shall at any time

(i.) Certify that the cottage is defective by reason of inadequate accommodation, want of repair, or sanitation (including water supply), and is of less value than a cottage which is free from such defects; and

(ii.) Determine the amount by which the value of the cottage occupied is less than the value of such a cottage, and in that case the value at which the provision of the cottage may be reckoned as payment of wages in lieu of payment in cash shall not exceed three shillings a

week less the amount so determined by the committee, and also less any rent and rates which may be paid by the occupier.

3. (1) Subject to and for the purposes of this Order every District Wages Committee shall from time to time in respect of their area or any defined part of their area—

(*a*) Ascertain and determine the current producers' wholesale prices of milk and potatoes, and

(*b*) Determine the amounts of the weekly sums at which the values of the provision of lodging and board are to be reckoned.

(2) In determining the amounts of the said weekly sums a District Wages Committee may specify sums varying according to the character of the lodging accommodation and meals provided, and shall have regard to the current prices within their area or the defined part thereof of articles included in such accommodation and meals and to the normal or average values at which under current contracts for employment in agriculture within such area or part such accommodation and meals appear to be reckoned.

4. Every determination of a District Wages Committee under this Order shall be reported as soon as may be to the Agricultural Wages Board who may vary such determination in any case, and shall publish or notify the same (including such variation, if any) in such manner as they think fit with a view to bringing the same so far as practicable to the knowledge of the persons affected thereby.

5. (1) In this Order the expression "District Wages Committee" means any District Wages Committee established under the District Wages Committee's Regulations, 1918.

(2) Any power or duty of a District Wages Committee under this Order may be delegated to a sub-committee or sub-committees thereof subject to the provisions of Clause 18 of the District Wages Committees' Regulations, 1918.

6. Except as in this Order provided no benefit or advantage shall be reckoned as payment of wages in lieu of payment in cash for the purposes of any minimum rate of wages fixed under the Corn Production Act, 1917.

7. This Order shall come into operation on the 9th day of September, 1918.

Exhibition of the Board of Agriculture Films at the Ministry of Information.

A PROGRAMME of cinematograph films was shown to an audience of officers of the Board of Agriculture, Ministry of Information and the War Aims Committee, at the Ministry of Information, on 4th September. The films were a selection of those which had been acquired by the Board during the last six months, mainly for the purpose of exhibition by means of the War Aims Committee's cinemotors, which will travel in specified country districts during the coming autumn, winter and spring, for the purpose of exhibiting interesting and instructive Government films. These cinemotors have been specially designed to enable films to be projected out-of-doors on a blank wall of almost any kind of building, as well as in halls and similar places,

and it will be possible, therefore, to give exhibitions in almost any country town or village. The Committee is arranging its programme so as to give agriculture a prominent place, and the films shown at the Exhibition on 4th September, together with others not yet completed, will form the catalogue from which the cinemotor agricultural programme will be made up. The programme shown on 4th September comprised the following films:—

"Mr. Robert Mond's Farm at Sundridge, Kent."
"Tractor Farming in America."
"Parasitic Mange in Horses."
"Cheese-making on a Small Holding."
"Celery-growing in Florida."
"Oxford Rally of the Women's Land-Army."
"Fruit-tree Grafting at Mr. W. W. Berry's Farm in Kent."
"Women Flax Harvesters at Sherborne."
"Hay-baling by Government Machinery"
"The Ilford Part-time Workers."

Other films are:—

"The Women's Land Army."
"Women's Test Meeting at Warrington."
"Helping the Food Controller at Bournville."
"Women's Land Army Rallies in London."
"Women Farmers of Great Britain"
"Co-operative Cheese-making."

In the provision of these films the Board have received very valuable assistance from the officials of the Cinematograph Department of the Ministry of Information, without whose expert advice and help it would have been impossible for them to have undertaken the preparation of some of them. The cinema promises to be a useful aid to agricultural education in the future.

Prices and Supplies of Agricultural Produce.

Part III. of Agricultural Statistics for 1917, dealing with prices and supplies of corn, live stock and other agricultural produce in England and Wales in 1917, has now been issued (Cd. 9163, 1918). Copies may be obtained direct, or through any bookseller, from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 3*d.* net, excluding postage.

In his report which prefaces the tables in this part, Sir Henry Rew arrives at 214 as the general index number of prices of produce sold off the farm in England and Wales in 1917, the average prices from 1906-8 being taken as the basal prices (=100). The index number in 1916 was 178, so that the prices increased 20 per cent. in 1917 over 1916. Representing the average prices of farm produce in 1906-8 as 100, the prices in 1917 are given as follows: Cattle 227, milk 203, sheep 190, pigs 252, hay 184, wheat 232, barley 228, potatoes 223, poultry and eggs 193, fruit 168, wool 194, butter 186, oats 257, cheese 214, beans and peas 284, vegetables 297. It may be explained, however, that the calculation of annual index numbers has necessarily been disturbed by the exceptional conditions of the times and t
of free markets for nearly all the staple articles

Maximum Retail and Wholesale Prices.

THE following is a list of Retail and Wholesale Maximum Prices of certain agricultural commodities fixed by the Food Controller (extracted from recent issues of the *National Food Journal*) :—

RETAIL MAXIMUM PRICES.

Butter—

Government Butter ..	2s. 6d. per lb.
British-made Butter ..	2s 4d. ,,

Cheese—

Government Cheese (imported British-made and Caerphilly) (including Dutch) ..	1s. 8d. ,,
British Cheese, not controlled in distribution by Government, an addition to actual cost to the Retailer, as defined by the British Cheese Order, not exceeding ..	2½d. ,,

Damaged Grain, Seeds, and Pulse—

For quantities not exceeding 7½ qr., add to traders' prices	4s. per qr.
For quantities of less than half a qr. ..	8s. ,,

Milk—

(Winter prices, subject to variation by local Committees with the sanction of the Food Controller)—

1st October to 21st November, 1918 ..	3s. 0d. per imp. gal.
22nd November, 1918, to 30th April, 1919 ..	3s. 4d. ,,

Poultry and Game—

	Price at the Rate per lb. s. d.	Price for the Bird. s. d.
Cockerel, pullet, cock or hen—		
Weighing 6 lb. or less ..	2 8	—
,, more than 6 lb. ..	—	16 0
Domestic duck—		
Weighing 6 lb. or less ..	2 3	—
,, more than 6 lb. ..	—	13 6
Turkey ..	2 8	—
Goose ..	1 8	—
Guinea fowl ..	—	7 0
Grouse and black game, young birds (hatched in 1918 and sold prior to 1st November, 1918) ..	—	5 6
All other grouse and black-game ..	—	3 3
Partridges, young birds (hatched in 1918 and sold prior to 1st January, 1919) ..	—	4 0
All other partridges ..	—	2 3
Pheasants (cocks) ..	—	7 0
Pheasants (hens) ..	—	6 6

Poultry Mixtures or Horse Corn Mixtures—

Profits permitted on cost price—

More than 6 cwt. ..	1s. per cwt.
Less than 6 cwt. and not less than 3 cwt...	3s. ,,
,, 3 ,, ,, ,, ½ ,, ..	4s. ,,
,, ½ ,, ..	½d. per lb.

Horse Chaff Mixtures—

1 ton or more ..	1s. per cwt.
Less than 1 ton and not less than 5 cwt. ..	2s. ,,
Less than 5 cwt. and not less than ½ cwt...	3s. ,,
Less than ½ cwt. ..	1s. per 14 lb.

Rabbits, Wild .. 9½d. per lb.

Vegetable Marrows .. 1d. per lb.

No marrow may be sold at a higher price than 7d.

WHOLESALE MAXIMUM PRICES.

Butter—

	Per lb. s.	d.
Government Butter.		
In bulk, delivered	2	3
In rolls, etc., of 1 lb. or less, delivered	2	3½
British-made Butter.		
(*a*) When sold by a wholesaler—		
In bulk, delivered	2	1
In rolls, etc., of 1 lb. or less, delivered	2	1½
(*b*) When sold by the producer to a retailer—		
In bulk, *ex* creamery, factory or farm	2	1
In rolls, etc., of 1 lb. or less, *ex* creamery, factory or farm	2	1½
(*c*) When sold by the producer to a wholesaler—		
In bulk, *ex* creamery, factory or farm	1	11½
In rolls, etc., of 1 lb. or less, ex creamery, factory or farm	2	0½

Cheese—

Maximum first-hand prices for delivery—	On and after 9th Aug. until further notice. Per lb. s.	d.
Caerphilly, whole milk	1	6½
,, partially skimmed—*i.e.*, containing at least 25 per cent. of fat in the dry matter ..	1	5
,, wholly skimmed—*i.e.*, containing less than 25 per cent. of fat in the dry matter ..	0	11
Any whole milk cheese not exceeding 2 lb. weight uncut, other than Caerphilly	1	10
Maximum first-hand prices for cheese manufactured—		
Ripened Stilton and Wensleydale (blue)	1	10
Dorset, hand-skimmed (blue)	1	4½
,, separated (blue)	1	0½
,, ,, (white)	0	11
All other whole milk cheese	1	8
,, *partially skimmed cheese*—*i.e.*, cheese containing at least 25 per cent. of fat in the dry matter ..	1	2½
,, wholly skimmed cheese—*i.e.*, cheese containing less than 25 per cent. of fat in the dry matter ..	0	11

In all cases prices are *ex* factory or *ex* farm.

Grain—

Date of Sale of Grain sold.	Wheat and Rye per qr. of 504 lb. s.	d.	Barley per qr. of 448 lb. s.	d.	Oats per qr. of 336 lb. s.	d.
Where sale is made before 1st October, 1918, the price shall not exceed ..	75	6	67	0	47	6
Where sale is made in October, 1918, the price shall not exceed	75	6	67	0	48	0
Where sale is made in November, 1918, the price shall not exceed	75	6	67	0	48	6
Where sale is made in December, 1918, the price shall not exceed	75	6	67	0	49	0
Where sale is made in January, 1919, the price shall not exceed	76	0	67	0	49	6
Where sale is made in February, 1919, the price shall not exceed	76	0	67	0	50	0
Where sale is made in March, 1919, the price shall not exceed	76	0	67	0	50	6
Where sale is made in April, 1919, the price shall not exceed	76	6	67	0	51	0
Where sale is made in May, 1919, the price shall not exceed	76	6	67	0	51	6
Where sale is made on or after the 1st June, 1919, the price shall not exceed	76	6	67	0	52	0

The prices are increased by 1*s.* per qr. where the grain is carried, without railway transport, direct from producer's premises to mill or factory for the purpose of manufacture.

On a purchase of oats suitable for the manufacture of oatmeal or other oats products for human food by a manufacturer specifically for the purpose of such manufacture, or by a recognised dealer in fulfilment of a specific order given in writing by such manufacturer for such purpose, the maximum price is the standard rate plus 3*s.* per qr.

The maximum prices of wheat, rye and barley so damaged as to be unfit for use in the manufacture of human food and of tailings, dressings and screenings which are unfit for such use are 7*s.* per qr. less than the standard rate.

The maximum price of oats improperly cleaned or containing an undue quantity of soil, and of oats tailings and dressings, is 5*s.* per qr. less than the standard rate.

On purchase of grain from a recognised dealer who is not the producer of the grain sold the maximum price is the standard rate plus 1*s.* per qr.; or for a quantity not exceeding 7½ qr. sold to one buyer in any period of seven consecutive days including the day of sale, the standard rate plus 5*s.* per qr.; or for a quantity of less than half a qr. the standard rate plus 9*s.* per qr.

Payment in all cases to be net cash within seven days of completion of delivery, and moneys then unpaid to carry interest thereafter not exceeding the rate of 5 per cent. per annum or bank rate, whichever shall be the higher.

The grain to be delivered free on rail or barge, or to mill or store in accordance with the usual custom of the district, and any freight, haulage, porterage and cartage subsequently incurred shall be for the buyer's account.

All sack hire up to and including the time of delivery to rail, barge, mill or store by the producer to be for the producer's account, and all charges for sacks subsequent thereto to be for the buyer's account.

Where grain is sold on terms and conditions other than these terms and conditions a corresponding adjustment is to be made in the maximum price. In particular: (*a*) Where grain is delivered by the producer to a distance greater than the distance corresponding with the usual custom of the district, a sum at the rate of 9*d.* per ton per mile for the extra distance shall be added to the maximum price. (*b*) Where delivered by the producer at his premises, a sum at the rate of 9*d.* per ton per mile for the distance corresponding with the usual custom of the district shall be deducted from the maximum price. (*c*) Where any home-grown grain has been mechanically treated by gristing, crushing, bruising, kibbling, splitting or other kindred process, or has been kiln-dried or dried by other mechanical method, the maximum price is to be ascertained by adding to the price otherwise applicable according to the provisions of the Order, the cost of such treatment not exceeding a usual and reasonable charge.

Damaged Grain, Seeds, and Pulse—

Imported feed wheat	72*s.* per 480 lb.
Damaged imported wheat	65*s* ,, ,,
,, ,, rye	65*s.* ,, ,,
,, ,, maize	65*s.* ,, ,,
,, ,, and home-grown pulse and seeds (other than oil seeds) used for feeding purposes	65*s.* ,, ,,
,, ,, barley	55*s.* ,, 448 lb.
,, ,, oats	41*s.* ,, 336 ,,

Milk—(Winter Prices for Great Britain)—

Producers' price for delivery to buyer's premises or railway station—

October, 1918, to April, 1919, inclusive .. 2*s.* 3*d.* per imp. gal.

Together with railway charges (if any) paid by the producer for carriage to the buyer's railway station.

Wholesale dealer's price for delivery to buyer's railway station—

October, 1918, to April, 1919, inclusive .. 2*s.* 5*d.* per imp. gal.

Together with railway charges paid by the seller for carriage from

Cattle Foods—

	Per ton. £	s.	d.
Home Manufactured Cakes and Meals—			
Linseed cake containing not less than 8 per cent. oil ..	19	0	0
Cotton seed cake ..	14	10	0
Undecorticated ground nut cake ..	17	5	0
Semi-decorticated ground nut cake ..	18	2	6
Decorticated ground nut cake ..	19	0	0
Palm kernel cake ..	13	15	0
Rape cake ..	14	0	0
Copra cake ..	16	5	0
Sesame cake ..	18	10	0
Soya cake ..	19	0	0
Extracted palm kernel meal ..	13	10	0
,, rape meal ..	14	0	0
,, soya meal ..	18	15	0
Imported Cakes and Meals—			
North American linseed cake ..	19	5	0
Argentine linseed cake ..	19	15	0
Canadian linseed cake ..	19	10	0
Australian linseed cake ..	19	10	0
Spanish and Portuguese linseed cake ..	19	10	0
Egyptian cotton seed cake ..	15	0	0
Decorticated cotton seed meal ..	19	15	0
,, ,, cake ..	19	15	0
Repressed cotton cake ..	20	15	0
Semi-decorticated cotton cake ..	17	10	0
Copra cake ..	17	10	0
Palm kernel cake ..	15	0	0
Rangoon rice meal ..	16	10	0
Italian rice meal ..	14	10	0
Canadian rice meal ..	17	0	0
Egyptian rice meal ..	17	0	0
Gluten feed ..	17	5	0
Maize meal cake ..	17	5	0
Compound Cakes and Meals (made from two or more ingredients when no oil is expressed in the process of manufacture)—			
Cakes and meals containing not less than 7 per cent. oil and not less than 20 per cent. albuminoids ..	17	5	0
Cakes and meals containing not less than 6 per cent. oil and not less than 20 per cent. albuminoids ..	17	0	0
Cakes and meals containing not less than 6 per cent. oil and not less than 17 per cent. albuminoids ..	16	17	6
Millers' Offals—			
Flour millers' offals of all kinds ..	13	0	0
Fine barley dust ..	17	0	0
Coarse barley dust ..	8	0	0
Oat dust ..	6	0	0
,, husks ..	3	0	0
,, husk meal ..	5	0	0
Miscellaneous—			
Malt culms ..	13	5	0
Kiln dust ..	11	0	0
Dried distillers' grains ..	15	5	0
,, brewers' ale grains ..	14	5	0
,, ,, porter and mixed grains ..	14	0	0
	Per usual trade quarter. £	s.	d.
Wet brewers' ale and distillers' grains for October—April delivery ..	0	8	4
Wet brewers' porter and mixed grains for October—April delivery ..	0	7	10
Wet brewers' ale and distillers' grains for May—[illegible]	[illegible]	[illegible]	4

Cattle Grading—

Bulls, Bullocks and Heifers.

		Per cwt.
1st Grade,	56 per cent. and over	75s.
2nd ,,	52 per cent. to 56 per cent.	70s.
3rd ,,	48 per cent. to 52 per cent.	65s.
4th ,,	under 48 per cent.	55s.

Cows.

		Per cwt.
1st Grade,	52 per cent. and over	70s.
2nd ,,	46 per cent. up to 52 per cent.	62s.
3rd ,,	42 per cent. up to 46 per cent.	53s.
4th ,,	under 42 per cent.	45s.

Horse Mixtures and Poultry Mixtures—

Profits permitted on cost price .. .. 30s. per ton.

Pigs—

Live weight	21s. per 20 lb.*
Dead weight (offal excluded)	26s. 9d. ,,
,, (offals included)	28s. ,,

(No pig may be sold for slaughter weighing less than 112 lb. live weight.)

Poultry and Game—

	Price at the Rate per lb. s. d.	Price for the Bird. s. d.
Cockerel, pullet, cock or hen—		
Weighing 6 lb. or less	2 2	—
,, more than 6 lb.	—	13 0
Domestic duck—		
Weighing 6 lb. or less	1 10	—
,, more than 6 lb.	—	11 0
Turkey	2 2	—
Goose	1 4	—
Guinea fowl	—	5 6
Grouse and black game, young birds (hatched in 1918 and sold prior to 1st November, 1918) ..	—	4 3
All other grouse and black game	—	2 6
Partridges, young birds (hatched in 1918 and sold prior to 1st January, 1919)	—	3 3
All other partridges	—	1 9
Pheasants (cocks)	—	5 6
,, (hens)	—	5 0

Potatoes, Ware (1917 Crop)—

For potatoes delivered after 14th May, 1918 ..	£7 10s. per ton.
Wholesalers' prices: average profit during any week not to exceed	7s. 6d. ,,

Rabbits, Wild—

Collector's price. (A collector is a person who calls for and collects wild rabbits from the first owner of the dead carcass)	6d. per lb.
Any other wholesale sale	8d. ,,

Vegetable Marrows—

Grower's Prices—

Vegetable Marrows—*cont.*

On a sale to a person who declares in writing that he is buying for the purpose of sale by retail, price *ex* market or (at the seller's option) delivered to buyer's premises	£6 10*s*. per ton.
On sales to any other person, price f.o.r., ship, or barge, at grower's station, port, or wharf ..	£5 10*s*. „
Price for any person but the Grower— *Ex* market or (at the seller's option) delivered to buyer's premises	£6 10*s*. „

Prosecutions of Farmers, etc., under Statutory Rules and Orders.

Barking.—James Soper, Low Hall Farm, Chingford, on sales of adulterated milk, £10.

Brentford.—Arthur Brown, farmer, Hounslow, on sales of watered milk, £20. (*National Food Journal*, 25th September, 1918.)

Further Notice as to Rabies.

THE following Notice was issued by the Board on 11th October:—

On the 7th of September a case of rabies was detected in a dog at Plymouth.

There is every reason to believe that this disease had existed unrecognised in this district for some weeks or even months earlier. Twenty-two further cases have since been discovered by the officers of the Board of Agriculture and Fisheries and many other suspected cases are under investigation.

There is grave risk of the spread of this most dangerous disease unless the public co-operate with the police and the officials of the Board of Agriculture in securing the observance of the Regulations and giving information. The district between St. Blazey, Cornwall, and the Avon River, Devon, must be considered as the specially dangerous area.

No person travelling into Devon or Cornwall should take a dog with him at the present time. The dog may contract rabies; it must wear a muzzle while in the area and it cannot be moved out of these counties except to licensed veterinary premises where it will be isolated and detained for four months.

It is known that a number of dogs were moved out of the area before the Orders restricting movement came into force. Owners are warned of the grave risk that both they themselves and the public run from such dogs being at large. They should at once acquaint the Board of Agriculture and arrange for the removal of the dog to veterinary premises. The incubation period of rabies varies between twelve days and many months, the disease often develops suddenly, and incalculable harm may be wrought before a "mad dog" can be destroyed.

Supply of Concentrated Feeding Stuffs: General

IN reference to the scheme of distribution of feeding stuffs which will come into operation on 17th November (as stated at page 889), the general scale of rations covering

Class of Live Stock.	*Maximum Allowances per Head for Ten-weeks' Period.*
A.—Dairy cattle in milk—	
1. Kept under rural conditions.	$1\frac{1}{2}$ cwt. cake or meal and $1\frac{1}{2}$ cwt. offals or grains.
2. Stall-fed and kept under town conditions.	2 cwt. cake or meal and 3 cwt. offals or grains.
Calves under 6 months ..	$\frac{1}{2}$ cwt. cake or meal and $\frac{1}{2}$ cwt. offals or grains.
B.—Horses used for agricultural purposes.	$\frac{1}{2}$ cwt. offals (bran).
C.—Bulls over 6 months kept for breeding.	$1\frac{1}{2}$ cwt. cake or meal.
Sows in farrow and boars ..	2 cwt. offals or grains.
Store pigs	$\frac{5}{8}$ cwt. offals or grains (= 1 lb. per day).

NOTICE OF BOOKS.

Food and How to Save It (3rd Edition). Edmund I. Spriggs, M.D., F.R.C.P. (London: H.M Stationery Office, 1918, 3*d.* net).—This publication of 55 pages is issued under the auspices of the Ministry of Food for the help of those who are interested in the present food question. Information on the various kinds of food, including bread and cereals, meat, fish, fruit and vegetables, is given, and the relative values of different foods in terms of calories is shown in a table and a coloured diagram. Suggestions as to the dietary for different classes of workers are offered, with a view to assisting people in living on the scale of rations prescribed by the Food Controller. A number of useful war-time recipes are also given.

A limited number of copies is available (gratis) for public speakers and others interested. Application should be made to the Ministry of Food (Room 605), Palace Chambers, Westminster, London, S.W. 1.

Rats and Mice as Enemies of Mankind. (London: British Museum (Natural History), Economic Series No. 8, 1918, 1*s.* net.) The author of this pamphlet, Mr. M. A. C. Hinton, shows how urgent is the necessity for co-ordinated action in reducing the numbers of rats and mice in this country. He points out the immense amount of damage to food caused by these vermin and the extent to which they are carriers of disease, and suggests various methods for their extermination. The two species of rats, the black rat and the brown rat, and the one species of mouse, in Great Britain, are described, and an account given of their history and breeding and general habits. The pamphlet contains 63 pages, and is illustrated by two plates and six text figures.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for September, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Spain, England and Wales, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 224,420,000 qr. in 1918, against 191,613,000 qr. in 1917, or an increase of 17·1 per cent. *Rye.*—The estimated production in Spain, Canada, and United States is placed at 13,096,000 qr. this year, or an increase of 27·3 per cent. compared with last year, when it amounted to 10,288,000 qr. *Barley.*—The production in Spain, England and Wales, Canada, United States, Japan, Egypt, and Tunis is estimated to amount to 62,595,000 qr. in 1918, against 60,674,000 qr. in 1917, or an increase of 3·2 per cent. *Oats.*—It is estimated that the total yield in Spain, England and Wales, Canada, United States and Tunis will amount to 213,894,000 qr. in 1918, against 221,321,000 qr. in 1917, or a decrease of 3·4 per cent. *Maize.*—The production in Canada and United States is estimated at 312,575,000 qr. this year, against 369,406,000 qr. last year, or a decrease of 15·4 per cent.

Denmark.—According to an official report for 1st September, the condition of wheat has somewhat improved and other crops maintain their promise. Wheat and rye are over average, barley about average, but oats under average. Potatoes are over average. (*London Grain, Seed, and Oil Reporter*, 19th September, 1918.)

Italy.—According to an official announcement, the yield of wheat this year will amount to some 20,000,000 qr. against 17,500,000 qr. last year. (*The London Grain, Seed, and Oil Reporter*, 21st September, 1918.)

Netherlands.—According to a report received from H.M. Consul-General at Rotterdam on agricultural conditions during the period 15th July to 15th August, the rain, followed by better weather, had been beneficial, and the general prospects throughout the country were as follows: (100 = excellent; 90 = very good; 70 = good; 60 = fairly good; 50 = moderate; an average crop is indicated by 67.) The figures in brackets give the condition of the crop in July. Wheat, 71·2 (71·7); winter barley, 69·0 (69·2); summer barley, 61·8 (62·8); oats, 63·2 (58·8); rye, 71·5 (71·0); beans, 68·6 (69·5); peas, 66·4 (69·7); potatoes, 63·2 (60·0); clovers, 64·9 (57·5); meadows, 66·0 (46·7).

Sweden.—According to the official crop report issued at Stockholm on 16th September, the weather, which, during August had been very favourable for harvesting, had been, during September, wet and cold. In the south and middle of Sweden harvesting was finished, but further north it was still going on. Barley and oats are full average crops, but the hay crop is small. The condition of crops at the end of August was as follows, last year's figures being given in brackets (5 = very good; 4 = good; 3 = average; 2 = small):—Wheat, 3 (2·4); barley, 3 (2·8); oats, 3 (2·8); rye, 3 (2·0); mixed corn, 3·1 (2·5); hay, 2·1 (2·3); potatoes, 3·3 (3·3). The area under wheat and rye has been increased by 178,000 acres, this gain being obtained at the expense of oats, meadows, and fallow land. (*Broomhall's Corn Trade News*, 2nd 8th October, 1918.)

Canada.—The High Commissioner for Canada, in a report dated 26th September, states that a preliminary estimate issued by the Dominion Bureau of Statistics gives the yield of wheat per acre for all Canada as follows: Spring wheat, 12½ bush., against 15½ bush. last year, and an average for the last ten years of 19 bush.; autumn wheat, 16½ bush., against 21½ bush. last year and a ten years' average of 23 bush.

United States.—According to the report issued by the Bureau of Statistics of the Department of Agriculture, the following are the estimated yields of cereals for the present year as indicated by the condition of the various crops on 1st October (the final official returns for last year are given in brackets): Winter wheat, 556,000,000 (418,070,000) bush., being an average yield of 15·3 (15·2) bush. per acre; spring wheat, 363,000,000 (232,758,000) bush., or 16·1 (12·6) bush. per acre; all wheat, 919,000,000 (650,828,000) bush., or 15·6 (14·2) bush. per acre; barley, 237,000,000 (208,975,000) bush., or 26·0 (23·7) bush. per acre; oats, 1,535,000,000 (1,587,286,000) bush., or 34·5 (36·4) bush. per acre; maize, 2,718,000,000 (3,159,494,000) bush., or 23·9 (26·4) bush. per acre; linseed, 15,600,000 (8,473,000) bush., or 7·9 (4·7) bush. per acre. The average quality of spring wheat is 94·8 (92·7) and of oats, 93·6 (95·1), and the average condition of maize is 68·6 (75·9), and of linseed, 70·8 (51·3) (*The London Grain, Seed and Oil Reporter*, 9th October, 1918.)

South Africa.—According to the July report of the Department of Agriculture, the wheat area this year is 2 per cent. greater than last year, when there was an increase of 23 per cent. over the previous year. Last year the acreages of barley and oats showed an increase of 2 and 3 per cent. respectively, but this year both show a decrease of 5 per cent. This year's yield of wheat is estimated at approximately 2,860,000 muids (about 1,000,000 qr.) (*The London Grain, Seed, and Oil Reporter*, 2nd October, 1918.)

Live Stock in New Zealand.—The number of sheep in New Zealand on the 30th April, 1918, was 26,354,594, as compared with 25,270,386 on the same date in 1917, or an increase of 4·3 per cent. (*International Crop Report and Agricultural Statistics*, September, 1918.)

Agricultural Conditions in England and Wales on 1st October.

THE reports furnished by the Crop Reporters of the Board on agricultural conditions in England and Wales show that September was everywhere a very wet month, causing much delay in the fields. Corn which had not been carried by the first week of the month was very often still in the fields at the beginning of October, and this had caused sprouting in many parts of the country, most damage being done in the north and west. The corn which has been harvested during this month is generally not in good condition.

In Lincolnshire a certain proportion of the main crop of potatoes has been lifted, but elsewhere little has been done, apart from harvesting the earlies and second earlies, owing to the protracted corn harvest and wet weather. Very little disease is reported, and prospects for a yield

The roots have grown well during the wet weather, and prospects have somewhat improved, especially those of turnips and swedes, although they are still of small size, and fields are often patchy. Their yield is expected to be about 91 per cent. of the normal, while that of mangolds, which would have done better with more warmth, is expected to be 96 per cent. of the average.

Turnips grown for seed in the eastern counties have generally yielded satisfactorily, but the quality of much of the mangold seed has been affected by the wet; and prospects for red clover are not satisfactory.

Autumn cultivation is, upon the whole, backward, although there are districts—those where much of the corn was secured during August—where it is often considered to be forward. But the very wet weather has in most parts of the country prevented much work of this character, even where the corn crops have been cleared. Much ploughing has been done by tractors, which are of great assistance.

Seeds are rather variable, but in many places there is a good healthy plant, and they are satisfactory as a whole, though often patchy. Some harm is being done by the corn stooks remaining so long in the fields.

Pastures generally have plenty of grass, but from all parts it is reported that its quality or feeding value is poor, owing to the excessive wet. Live stock can consequently only be said to have done moderately well during the month, the cold and wet, combined with scarcity of artificial foods, having been against them.

Labour continues scarce, bnt with relatively little work possible the deficiency has not been so severely felt as in some months.

The following local summaries give further details regarding agricultural conditions in the different districts of England and Wales:—

Agricultural Labour in England and Wales during September.

Northumberland, Durham, Cumberland, and Westmorland.—In a few districts there is sufficient labour, but generally increased numbers would be welcomed.

Lancashire and Cheshire.—The supply of labour is generally short, but owing to the wet weather the deficiency has not been felt so much as it would have been under better conditions.

Yorkshire.—On the whole the supply of labour is not very deficient.

Shropshire and Stafford.—Labour has been very scarce, especially in districts where the women have been employed in blackberry gathering, but with the help available the work has been done.

Derby, Nottingham, Leicester, and Rutland.—Though the supply of skilled labour is short, sufficient soldiers, women, and German prisoners have generally been available.

Lincoln and Norfolk.—In a few districts the supply of labour is short, but as a rule enough unskilled workers are available.

[illegible]—Conditions are unchanged.

Bedford, Northampton, and Warwick.—The supply of labour, though deficient in a few districts, is generally about sufficient to meet the requirements.

Buckingham, Oxford, and Berkshire.—Temporary help has been sufficient except in the case of thatchers.

Worcester, Hereford, and Gloucester.—The supply of labour is generally deficient, but in a few districts owing to local circumstances it has not been much felt. Assistance has been rendered by women, soldiers, and prisoners of war.

Cornwall, Devon, and Somerset.—Labour is very scarce, particularly skilled men, and the shortage has been made up to some extent by the employment of women, soldiers, and war prisoners.

Dorset, Wiltshire, and Hampshire.—The supply of labour is short, but the work has been carried on with the usual assistance.

Surrey, Kent, and Sussex.—Conditions are little changed. Labour is short, but substitutes have in many cases done excellent work.

Essex, Hertford, and Middlesex.—The supply of labour, especially skilled, is deficient, but with soldiers, women, and German prisoners helping, farmers are just about able to cope with the work.

North Wales.—The supply of labour is deficient.

Mid Wales.—Skilled labour is very scarce, but with the help of soldiers, women, and prisoners of war the farmers have been able to get through the work.

South Wales.—Skilled labour is lacking, but temporary help has been sufficient.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of September, 1916, 1917, and 1918.

—	Wheat.			Barley.			Oats.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
London ...	60 7	73 6	73 7	53 7	60 2	60 6	32 10	50 1	54 11
Norwich ...	56 11	71 9	72 5	49 7	60 4	60 8	30 7	46 0	54 4
Peterborough	58 7	69 9	72 0	53 0	56 6	60 0	29 7	41 10	45 3
Lincoln ...	59 9	70 0	72 2	52 1	57 8	60 0	30 3	45 5	54 0
Doncaster ...	59 6	71 11	71 10	53 10	56 4	59 10	31 4	44 7	—
Salisbury ...	58 5	71 11	72 1	49 9	61 2	61 3	31 0	50 5	44 2

STATEMENT showing the Average Price of **British Corn,** per Quarter (Imperial Measure), for the Quarter ending Michaelmas, 1918, pursuant to the Corn Returns Act, 1882.

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	Wheat.			Barley.			Oats.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Jan. 5...	55 8	76 0	71 2	47 8	66 4	58 0	31 5	47 1	45 5
" 12...	56 7	75 8	71 2	48 6	65 7	58 2	31 11	47 2	46 9
" 19...	57 2	75 8	71 3	49 6	64 9	58 1	32 6	47 4	47 9
" 26...	58 0	75 10	71 1	51 0	64 5	58 7	32 11	47 8	48 2
Feb. 2...	58 3	75 10	71 2	52 5	64 0	58 10	32 4	47 3	50 2
" 9...	57 6	76 0	72 0	52 10	63 5	59 0	32 2	46 11	50 6
" 16...	56 11	76 3	72 3	53 6	63 8	58 11	31 9	47 3	52 0
" 23...	58 2	76 9	72 2	54 2	63 9	58 9	32 2	47 8	52 3
Mar. 2...	59 4	77 4	72 2	55 7	64 0	57 9	32 4	48 0	52 0
" 9...	58 2	78 0	72 3	55 6	63 7	58 5	32 3	48 7	52 2
" 16...	57 9	78 10	72 4	55 4	64 1	56 10	31 10	49 4	51 0
" 23...	55 11	80 3	72 3	54 6	65 6	56 9	31 4	50 4	50 3
" 30...	53 6	81 5	72 4	53 8	71 10	56 7	30 5	51 10	48 10
Apl. 6...	51 8	84 4	72 11	53 7	69 11	56 7	30 1	55 1	49 10
" 13...	53 2	85 2	73 3	53 1	71 10	56 6	30 7	57 2	47 2
" 20...	55 3	84 10	73 3	52 10	70 6	56 6	31 8	59 8	47 0
" 27...	56 3	81 1	73 3	53 5	69 5	56 10	32 4	58 6	46 8
May 4...	55 7	77 7	73 5	53 1	64 4	56 5	32 10	54 9	47 4
" 11...	55 5	78 0	73 5	53 5	64 11	56 6	33 1	55 2	47 6
" 18...	55 0	77 11	73 4	52 10	64 10	56 6	33 0	55 2	46 4
" 25...	54 7	78 0	73 3	52 9	64 9	56 6	33 4	54 11	47 8
June 1...	53 3	78 0	73 8	53 9	65 11	60 0	33 3	54 11	44 9
" 8...	51 2	78 0	73 11	52 8	67 7	59 2	32 7	55 0	45 5
" 15...	48 10	78 2	74 3	50 9	75 6	57 9	32 1	55 1	45 7
" 22...	47 6	78 1	74 4	49 10	75 0	58 5	31 3	55 2	47 8
" 29...	46 3	78 3	74 4	49 1	73 11	57 10	30 10	55 1	46 4
July 6...	46 3	78 1	74 4	45 6	69 5	61 7	30 8	55 2	46 10
" 13...	48 11	78 2	74 4	47 5	70 10	57 5	31 6	55 1	47 0
" 20...	51 6	78 3	74 3	48 8	72 1	60 5	32 3	55 2	45 4
" 27...	53 5	78 3	74 3	47 2	65 7	56 11	32 5	55 2	46 2
Aug. 3...	55 1	78 2	74 3	46 1	73 6	57 1	32 9	55 0	45 10
" 10...	56 7	78 4	74 7	46 11	76 1	57 7	31 2	55 0	46 3
" 17...	58 1	78 7	74 2	48 0	68 11	61 4	30 8	55 6	55 11
" 24...	59 0	76 7	74 8	47 1	70 7	62 6	31 6	54 7	56 9
" 31...	59 4	72 1	74 8	48 5	60 4	60 1	30 5	49 0	57 11
Sept. 7...	59 3	71 6	72 3	51 7	59 3	60 4	31 1	46 7	56 9
" 14...	59 11	70 7	72 5	52 6	57 2	60 1	30 9	45 0	49 2
" 21...	59 4	70 8	72 6	53 3	56 10	60 4	30 9	45 8	49 11
" 28...	58 10	70 6	72 7	54 1	58 5	60 3	31 1	44 7	50 3
Oct. 5...	59 2	70 8	72 8	54 5	57 9	60 3	30 9	44 9	50 9
" 12...	59 7	71 0	72 6	53 10	58 5	60 3	31 6	44 5	51 6
" 19...	60 9	70 8		53 8	59 3		31 11	44 1	
" 26...	62 10	70 10		54 6	60 1		32 10	43 0	
Nov. 2...	66 7	70 4		56 2	59 11		34 0	42 4	
" 9...	69 8	70 3		58 0	60 2		35 8	42 11	
" 16...	70 9	70 3		59 8	60 2		37 8	43 0	
" 23...	70 [illegible]	70 2		61 8	59 9		39 7	43 1	
" 30...	71 3	70 2		63 1	59 3		41 4	44 6	
Dec. 7...	72 1	70 7		65 6	58 7		44 1	43 5	
" 14...	73 2	71 2		66 5	58 0		45 10	43 6	
" 21...	74 8	71 1		67 3	57 7		46 5	44 2	
" 28...	75 10	71 1		67 5	57 7		47 4	44 10	

NOTE.—Returns of purchases by weight or weighed measure are converted to mperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in *September and August, 1918.*

(Compiled from Reports received from the Board's Market Reporters.)

Description.	September. First Grade.	September. Second Grade.	August. First Grade.	August. Second Grade.
	per cwt live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	75 5	70 0	75 3	70 0
Herefords	75 5	70 0	75 4	70 1
Shorthorns	75 1	70 0	75 1	70 1
Devons	75 2	69 10	75 3	70 0
Welsh Runts	—	—	—	70 0
Fat Cows	70 0	62 1	70 0	62 1
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d.
Veal Calves	12	10¾	14¼	12⅝
Sheep :—				
Downs	14½	14¼	14½	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14½	14¼	14¼	14½
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	53 18	41 16	53 4	41 6
,, —Calvers ...	49 3	39 17	50 8	39 14
Other Breeds—In Milk ...	47 2	36 7	47 2	37 17
,, —Calvers ...	42 0	37 10	—	—
Calves for Rearing	3 15	2 15	3 16	2 13
Store Cattle :—				
Shorthorns—Yearlings ...	18 0	15 4	17 10	14 16
,, —Two-year-olds...	27 10	23 6	27 1	22 18
,, —Three-year-olds	34 9	31 9	35 13	31 10
Herefords—Two-year-olds...	29 17	26 9	31 18	28 6
Devons— ,,	26 12	24 1	28 8	24 16
Welsh Runts— ,,	25 15	22 15	26 0	23 0
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs —	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	57 9	46 9	54 3	45 10
Store Pigs :—				
8 to 12 weeks old	43 4	32 2	48 10	36 3
12 to 16 ,, ,, ...	76 9	60 5	83 7	66 8

* Estimated carcass weight.

.—The prices per lb. for sheep do not include the value of the skins pelts, which during September made prices equivalent to an additional d. per lb. of the carcass weight for Downs, Longwools, Cheviots, Black-ed, and Cross-breds, and 1d. for Welsh, and during August 1d. per lb. Downs, Longwools, Blackfaced, Welsh and Cross-breds, and 1¼d. for iewints

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in September, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	116 6	116 0	—	116 6	116 6
	2nd	116 6	116 0	—	116 6	116 6
Cow and Bull	1st	116 6	116 0	116 6	116 6	116 6
	2nd	116 6	116 0	100 6	100 6	100 6
Irish: Port Killed ...	1st	—	—	116 6	116 6	116 6
	2nd	—	—	116 6	116 6	116 6
Argentine Frozen—						
Hind Quarters ...	1st	132 0	131 0	132 0	132 0	132 0
Fore „ ...	1st	101 6	102 0	101 6	101 6	101 6
American Frozen—						
Hind Quarters ...	1st	131 6	—	—	131 6	—
Fore „ ...	1st	101 0	—	—	101 0	—
Canadian Frozen—						
Hind Quarters ...	1st	127 0	—	—	127 0	—
Fore „ ...	1st	96 6	—	—	96 6	—
VEAL:—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	—	93 6	93 6	93 6	94 6
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	123 6	122 6	123 6	123 6	123 6
	2nd	123 6	122 6	123 6	123 6	123 6
English	1st	123 6	122 6	—	123 6	123 6
	2nd	123 6	122 6	—	123 6	123 6
Irish: Port Killed ...	1st	—	—	123 6	—	123 6
	2nd	—	—	123 6	—	123 6
Argentine Frozen ...	1st	123 6	122 6	123 6	123 6	123 6
New Zealand „ ...	1st	—	—	—	—	—
Australian „ ...	1st	—	—	—	—	—
LAMB:—						
British	1st	123 6	122 6	123 6	123 6	123 6
	2nd	123 6	122 6	123 6	123 6	123 6
New Zealand	1st	123 6	121 6	121 6	123 6	121 6
Australian...	1st	—	—	—	—	—
Argentine...	1st	123 6	122 6	123 6	123 6	123 6
PORK:—						
British	1st	—	149 6	149 6	149 6	149 6

VERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in September, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	25 9	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	240 6	—	238 0	—	240 6	—
CHEESE :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
BACON :—						
Irish (Green)	—	—	—	—	—	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	49 7	47 1
Irish	42 4	—	43 0	41 0	44 3	42 3
Egyptian	—	—	—	—	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
White Kidney ...	150 0	140 0	181 6	161 6	157 6	147 6
British Queen ...	150 0	140 0	166 6	151 6	155 0	145 0
Arran Chief	156 6	146 6	156 6	146 6	156 6	146 6
HAY :—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1918	1917.	1918.	1917.
Anthrax :—				
Outbreaks	13	19	189	348
Animals attacked	17	19	219	396
Foot-and-Mouth Disease : —				
Outbreaks	1	—	1	—
Animals attacked	8 *	—	8	—
Glanders (including Farcy) :—				
Outbreaks	2	3	25	21
Animals attacked	2	3	67	35
Parasitic Mange :—				
Outbreaks	121	85	3,592	1,957
Animals attacked	196	112	6,792	3,739
Rabies :—				
Number of cases	8	—	8	—
,, ,, Dogs affected	7	—	7	—
,, ,, other animals affected	1	—	1	—
Sheep-scab :—				
Outbreaks	8	9	260	404
Swine Fever :—				
Outbreaks	70	80	1,065	1,793
Swine slaughtered as diseased or exposed to infection	27	35	428	782

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	SEPTEMBER.		NINE MONTHS ENDED SEPTEMBER.	
	1918.	1917.	1918.	1917.
Anthrax :—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy) :—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange :—				
Outbreaks	5	3	92	40
Sheep-scab :—				
Outbreaks	19	21	222	292
Swine Fever :—				
Outbreaks	5	6	22	185
Swine slaughtered as diseased or exposed to infection	14	19	72	1.082

(49) [illegible] P. 121—134. 11,750. 10/18. J. T. & S., Ltd.

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EDITORIAL NOTES.

The End of the War and its Meaning for Agriculture.

THE conclusion of the fourth armistice, signed by the German representatives on the 11th November, brings with it the end of a great struggle—a struggle maintained not only by the fighting power of the forces of the Army and Navy but also by the heavy labour of our civil population at home. The victory of the Allies means much, and, so far as British farmers are concerned, it means that the food menace has been met. In this success the farmers have taken their share by the production of food at home. They will be gratified to know, from the preliminary statement recently issued by the Board, that taking the five crops—wheat, barley, oats, beans, and peas together—the gross production in England and Wales this year is quite 35 per cent. more than in 1917. Whether judged by the yield from an acre or by total production, all crops were better than in 1917. The fact that peace is now within arm's reach, as it were, is nevertheless no warrant for any relaxation of agricultural effort, for wastage has been great, shortage will be long-continued, and the demand for food will tax the world's resources. In the United Kingdom, therefore, the food production campaign must continue in the future until our arable soils produce more nearly their maximum, until the unprofitable grass lands are ploughed and the rest improved for the production of milk and meat, and until we are less dependent on imported essentials than hitherto. In the words of the Right Hon. R. E. Prothero (*President of the Board of Agriculture*) in a letter recently addressed to Lord Bledisloe: "Peace has its dangers as well as war. The need for home-grown food, both human and animal, is as urgent as ever. We cannot relax our efforts. We must continue to strain every nerve, and put out every muscle to produce every pound of bread and meat, every gallon of milk, and

every pound of vegetables we can. We must see to it that everywhere our existing arable land is cleaned and cultivated to the full, and that cultivation of each holding is raised to the best level of farming in the district."

* * * * * *

Feeding Stuffs.

FARMERS who have recently agitated for a part removal of the prohibition of the use of barley for stock-feeding, say to the extent of granting them 10 per cent. of their crops, will be glad to learn of the announcement just made (see p. 1029) that one-fifth (or 20 per cent.) of their threshings of barley may now be used by them for feeding purposes. In view of the increased acreage and yield of barley this year this concession will be most welcome, as it will make no less than 3,000,000 qr. of a valuable feeding stuff available for stock. It was further announced that the Cabinet have sanctioned a reduction in the percentage of flour to be taken from wheat, and this will provide an increase of approximately 18,000 tons weekly of offals for feeding purposes. This offal, moreover, will be of substantially higher quality than that now available. There is thus every prospect that the feeding-stuffs position will be relieved very early.

* * * * * *

Economy.

ALTHOUGH, as indicated above, there is soon likely to be some relief in the matter of feeding stuffs, farmers must not give way to extravagant hopes of plentiful supplies in the near future. Tonnage will still be restricted, and the demand upon it will be great. Farmers must aim at producing as much as possible of the feeding stuffs they require. It is essential that in the use of available feeding stuffs, fertilisers and other supplies, the strictest economy should be practised.

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Army Agriculture.

IT has been generally known that the Army has devoted considerable attention during the last year or two to food production, particularly as regards potatoes and other vegetables, and wide-spread interest has been taken in the several reports on the subject which have been published in the Press. In an article in this issue (p. 929) the Army Agricultural Committee gives a fairly full account of what the Army has been able to accomplish in the direction of food production—a statement which is of special interest at the moment when hostilities

Protection of Seed Grain from Birds.

A NUMBER of species of birds are responsible for considerable depredations in connection with the farmer's seed grain, and at this season of the year when other food is scarce, they occasionally cause great destruction in the newly-sown fields. Various steps are taken by farmers to prevent or reduce these losses, and anything which may assist to the desired end is likely to receive immediate attention at their hands. Apart from the protection from birds, it is essential that destructive dressings should not seriously impair germination of the grain, as it is feared is the case with some of the commonly used materials—particularly when these are carelessly employed. Farmers might, therefore, usefully read the note as to acetone tar given at p. 1021.

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Notice to Readers of the "Journal."

THE attention of the editor has been called to the fact that some issues of the *Journal* rapidly become out of print and that it is not easily possible to obtain copies when required. It seems desirable, therefore, to point out that owing to difficulties in connection with printing and the shortage of paper, the edition of each issue of the *Journal* is strictly limited to the number of copies which have been estimated to be readily disposable, with a small allowance for contingencies. For the last two or three years, however, the demand for the *Journal* has increased month by month, and the tendency is for each issue to run out of print at an early date after publication. Those who desire to receive the *Journal* regularly are advised to become regular yearly subscribers, as it is not possible to guarantee that an application for any issue can be met two or three weeks after publication. For example, a regular recipient of the *Journal* recently stated that he has given away numbers which contained special articles, thinking that they could easily be replaced, only to find that this was not the case.

* * * * * *

Forest Authority for the United Kingdom.

IN the August issue of this *Journal*, p. 518, it was stated that a central authority for afforestation for the United Kingdom would be set up, and that a policy of planting would be pursued with the least possible delay. It has recently been announced that an Interim Forest Authority has been appointed to make preliminary arrangements for developing afforestation in the United Kingdom, the

ARMY AGRICULTURE.

THE following article has been contributed by the Army Agricultural Committee :—

Speaking generally, three years ago there was no such thing as Army Agriculture. In 1915 a little flower garden was to be found here and there, and whitewash helped to smarten a camp. A year later the growth of small vegetables and relishes was begun; one officer boasts that he has grown his own mustard and cress for two years! It was not until 1917, when a national shortage of food was threatened, that the Army began to bestir itself; then, too, it was gradually recognised what a large quantity of good land had been appropriated for military purposes. Through the winter of 1917 many units proceeded to break up plots, small and large, with the co-operation of the Director-General of Lands. At the same time, encouraged by the Director of Supplies and Transport, schemes were initiated for cultivations in France, Egypt, Salonika and Mesopotamia.

Growth of Army Agriculture.—By January of this year Army cultivations had assumed such large proportions that the Army Council decided to appoint a Committee to co-ordinate and help with the work. The Committee was called the Army Agricultural Committee; Viscount Harcourt accepted the Chairmanship; two officers from the Lands Branch and a representative of the Food Production Department were appointed to serve on the Committee; and an officer from the Quartermaster-General's Staff became the Secretary. Army agriculture was now booming. On 16th March, 1918, an Army Council Instruction was issued (No. 280 of 1918). "The Army Council," it began, "desire to impress upon all ranks the need of increasing the supply of food and of growing it where it will be consumed, thereby reducing transport. Every opportunity should be taken to cultivate lands in and adjacent to barracks, camps, command depots, and hospitals." The Commander-in-Chief in each Command in the British Isles has appointed a Command Agricultural Committee with agricultural officers to advise units. The War Office has provided money for initial expenses where required, and Army manure free when locally available. Some additional labour, to supplement the work done by men in their spare time, has been found, from the Labour Corps, Non-combatant Corps, and Prisoners of War.

The two main objects of the Army Agricultural Committee at home are to prevent the waste of the large acreage of agriculturally valuable land now in the occupation of troops, and as far as possible to make the Army self-supporting in potatoes and other vegetables. With regard to the prevention of waste, just over 6,500 acres are to-day being cultivated by the Army in Great Britain and Ireland; this is largely made up of plots of from 2 or 3 to 30 yards square. In some camps every available corner has been tilled between and round the huts; in others, an old parade ground has been dug up by hand, manured and planted.

In spite of the remarkable results which have been achieved, the aim of Army cultivation to make His Majesty's Forces self-supporting in potatoes and other vegetables is as yet far from being realised. Allowing an average production of horticultural cultivation of 10 tons to the acre, the produce of the 6,500 acres now under cultivation will suffice to supply not more than 300,000 men with the full Army ration of fresh vegetables. In this connection it is interesting to note that the Armies in France are producing more than half the quantity of potatoes and vegetables (100 tons a day) that are being raised by the forces at home. Having regard to the difficulties under which the Army carries on its cultivation these achievements are of no mean order, and the value of the work done is to be measured, not only by the quantity of produce raised, but also by the effect of supplies of fresh vegetables on health, for, as is well known, these foods are Nature's chief preventive medicine against such diseases of malnutrition as scurvy.

It is a curious coincidence that the rate of increase in the acreage under Army cultivation during the past two years has been almost identical with the rate of increase of small cultivation by the civilian population in this country.

The assistance rendered by the Food Production Department to the Army in all this work cannot be overestimated, and sincere thanks are due to the officials of that Department, who have been indefatigable in their co-operation.

Difficulties.—Such in briefest outline is the agricultural work being done by His Majesty's Home Forces. But it is not all plain sailing. Any commanding officer will tell you the difficulties. Labour comes first. Three years ago it would have been an easy matter to find men to do some digging, but now every man is examined and re-examined and combed out until labour for the gardens has to be picked up as and when it can be found; one officer, who is responsible for 14 acres, reckons that the

FIG. 1.—Drainage Work, Whitehall Farm, Aldershot: Clearing a Stream.

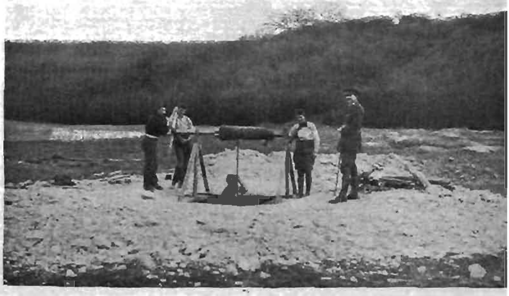

FIG. 2.—Convalescent Australians Well Sinking at Hurdcott Camp.

FIG. 3.—Ploughing up War Department Land, Aldershot.

FIG. 4.—Convalescent Australians Ploughing at Hurdcott Camp.

FIG. 5.—Ploughing with Horses at Hurdcott Farm.

FIG. 6.—Spraying Potates by Hand, Whitehall Farm. An Average Crop of 11 tons per acre was obtained from Reclaimed Derelict Land

FIG. 7.—A Horse-drawn Potato Sprayer at Work, Whitehall Farm.

FIG. 8.—A Horse-drawn Potato Digger at Work, Whitehall Farm.

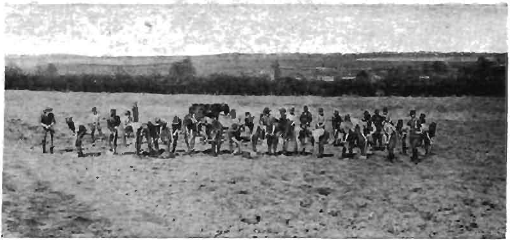

FIG. 9.—Convalescent Australians Reclaiming Land by Hand.

FIG. 10.—Cleaning a Root Crop at Whitehall Farm.

FIG. 11.—A fine Root Crop at Whitehall Farm, Aldershot

average length of time an individual soldier works for him is an hour-and-a-half! Even the farmer has not such a good cause for grumbling as that. Then the land is not always of the best, and some units are in quarters where cultivation is impossible; it is not difficult to find units bravely struggling to carry out the Instructions of the Army Agricultural Committee among sand dunes or on barren heaths. Then a unit may be moved at a moment's notice, and perhaps the camp vacated may be empty for the busiest gardening month of the year. It may also be impossible to find either among officers or men any one who knows even the elements of horticulture. One unit wishing to beautify its camp decided to plant 50 small fir trees. With great labour 50 holes were dug; next the trees were fetched. To the dismay of the officer in charge, the holes were found to be too small and the roots of the trees were therefore cut to fit the holes. This officer is still asking the casual visitor why his 50 trees are dead!

In the majority of cases, however, the standard of agricultural and horticultural knowledge possessed by officers and men is remarkably high, and to this fact is due not only the enthusiastic manner in which cultivation is being undertaken but also the success which is attending it.

Examples of Successful Work.—Three examples—of many which might be given—may be chosen to illustrate the work which is being done by units.

(1) An officer of the Army Ordnance Corps has 20 men under him; he has rented one acre adjoining his camp and has more than enough vegetables to feed all his men for the year; he has been growing potatoes, carrots, onions, broad beans, dwarf beans, runner beans, beet, cabbage, cauliflower, broccoli, Brussels sprouts, savoy, kale, shallots, leek, peas, turnip, radish, lettuce, marrow and tomato.

(2) At a very large hutted camp in the North of England, every small plot between and around the huts has been dug up and planted, mostly with potatoes. If it is found that one parade ground less would not interfere with training, it is dug up, with pickaxes if necessary. The area of all these plots added together is 200 acres, and, in addition, 250 acres adjoining the camp have been taken over and broken up for food production; a hard-headed Scottish farmer of low medical category manages this considerable farm.

(3) The third case is that of a commanding officer who was also a keen farmer, but found himself on impossible farming land; he therefore set to work to make use of the sewage

from his camp and is now growing cabbages on 16 acres of cleverly-irrigated land.

Live Stock.—Although the main agricultural energies of the Army are concentrated on growing vegetables, a certain amount of live stock is kept, but this is only encouraged to any great extent when there are no neighbouring farmers able and willing to make use of swill and refuse. The stock includes pigs, sheep, goats, rabbits, hens, geese, turkeys, and (in cases) bees. Everything produced by the Army is consumed instead of, not supplementary to, the ordinary ration, so that the result is a direct saving of food.

Almost every scheme, big and small, is a success financially—as, of course, it ought to be. Units have nothing to pay for their labour, as a general rule, and they get the land rent free with as much manure as is available. The chief expenses, therefore, are for seed and implements. Large profits are often the result, two-thirds of which in many cases come back to the State. Land, which three years ago produced nothing, now not only grows valuable food but returns to the taxpayer what in the aggregate amounts to a considerable sum of money.

Army Agriculture in the Theatres of War.—So much for the agricultural activities of the Army in the British Isles. It is not considered desirable to give detailed figures of cultivated acreage in the different theatres of war, but in each theatre very large schemes have been and are being undertaken, and as food is produced abroad a corresponding amount of valuable tonnage is being saved.

*Mesopotamia.**—The largest schemes undertaken by the Army are in Mesopotamia, where by skilful irrigation very large areas can be put under cultivation and made to yield results far greater and at less cost than anywhere else in the world. It is estimated that 850,000 acres are now under wheat or barley, and this will be increased to 1½ million acres in 1919. In 1919, it is estimated that 100,000 tons grain and 150,000 tons bhoosa will be available for the use of the Forces operating in that theatre of war besides large amounts for the native population. It is evident that a very great saving of tonnage is thereby effected at a time when such saving is of the utmost importance. Besides these schemes, vegetables are grown on a very large scale for the troops, and dairy farms have also been started.

Palestine.—In the occupied territories in Palestine, which are claimed to have great possibilities, considerable areas will be put under cultivation during the autumn of 1918.

* See also p. 1031.

FIG. 12.—Haymaking on War Department Land, Aldershot.

FIG. 13.—Haycutting at Whitehall Farm, Aldershot. An Average Crop of 25 cwt. per acre was obtained from Derelict Land.

FIG. [illegible]—Some of the Live Stock at Whitehall Farm

FIG. 15.—A fine Show of Vegetables grown on Reclaimed Land, Whitehall Farm.

FIG. 16.—Prize-winning Onions at the Aldershot Agricultural Show, grown at Whitehall Farm.

Salonika.—The Forces in Salonika are self-supporting as regards green vegetables, and are growing crops of potatoes, grain and fodder. The soil of Macedonia is extremely fertile and a good yield is obtained.

France.—In spite of the fact that it is on the front in France that the greatest amount of fighting and movement takes place, even here agricultural operations are undertaken which result in a large supply of vegetables, cereals and fodder. Some 20,000 acres of derelict crops are being harvested this year by the British Armies alone, off land behind the lines evacuated by the French farmers. In some cases binders have been at work within a mile of the front line. In addition to all this the supply of vegetables from camp and Army gardens is most satisfactory and of appreciable assistance to the Supply and Transport Department.

Agriculture in the Army is popular, and the success of a unit in this branch as in most others depends on the commanding officer. If he is lukewarm, it is simple to find adequate military excuses for doing nothing; if he is keen, the work gets done somehow: defaulters can be put on to dig; men can be encouraged to work overtime. In more than one case where 20 men have been urgently required for two hours' work the officers of a unit led by their commanding officer have postponed their dinners. Commanding officers on the whole are, fortunately, keen; so are all Commanders-in-Chief, also His Majesty the King, whose letter of congratulation given below has done much to encourage Commands in their cultivations.

"BUCKINGHAM PALACE,

My dear Harcourt, *20th June*, 1918.

During the King's recent visit to Aldershot, His Majesty had further occasion to see there, as elsewhere, the wonderful progress that is being made in cultivation under the direction of the Army Agricultural Committee.

The King has also heard with admiration and wonder of the agricultural work that is being carried on, not only in other parts of this country but also in various war regions overseas, and I am commanded to convey through you to the Agricultural Committees in the various Commands, His Majesty's congratulations on this most valuable and important contribution towards the food supply of the Army both here and abroad.

Yours very sincerely,

(Signed) STAMFORDHAM"

By a friendly arrangement with the Air Board the Army Agricultural Committee is lending its assistance to the promotion of cultivation by members of the Royal Air Service, and already in some aerodromes a border of potatoes and vegetables "divides the desert from the sown."

Finally, it is to be remembered that the Army has rendered, and is rendering, a large measure of help to farmers by supplying them with labour, and this not in large drafts only but also locally and in detail.

REPORT OF THE EDUCATION BRANCH FOR THE YEAR 1916-17.*

THE Report of the Education Branch for the financial year 1916–17—the preparation of which has been delayed owing to pressure on the depleted staff of the Branch—deals with the educational, research and advisory work of the various Institutions and Local Education Authorities during the previous scholastic year. The Grants shown in the tables below include, however, in some cases, instalments of the subsidies payable in respect of more than one educational year, and comparisons with the amounts paid in the previous year must, therefore, take account of adjustments which have sometimes to be made outside the financial years dealt with.

Table I. shows the Grants paid to Institutions providing Higher Agricultural Education. These Grants, which are made from the Board's Parliamentary Vote, have been reduced or withdrawn in certain cases, in obedience to Treasury injunctions, where the financial position of the Institution was such as to warrant that course. In addition to the two War casualties among these Institutions noted in last year's Report (the Royal Agricultural College, Cirencester, and the Uckfield Agricultural College) a further loss has to be recorded in the closing of the Holmes Chapel College, Cheshire. On the other hand, the Seale-Hayne College, Newton Abbot, makes its début, with a Grant of £200, which was made in aid of the equipment of the College Farm when the Institution was opened for the training of women for work on the land. The College buildings, the completion of which had to be suspended after the outbreak of war, have lately been taken over by the War Office for use as a military hospital. The new buildings erected for the

* Owing to the War this Annual Report is not being issued separately in its pre-war form.

TABLE I.—*Grants to Institutions for Higher Agricultural Education.*

Name of Institution and Work in respect of which a Grant was paid.	*Amount of Grant.* *1916-17.*	*1915-16.*
Universities and University Colleges.	£	£
Aberystwyth, University College of Wales :—		
Agricultural Instruction	600	1,000
Bangor, University College of North Wales :—		
Agricultural Instruction	1,200	1,200
Forestry ,, ...	250	250
Cambridge, University of :—		
Agricultural Instruction	1,200	1,200
Forestry ,, ...	250	250
Leeds, University of :—		
Agricultural Instruction	1,100	1,200
Manchester, Victoria University :—		
Agricultural Instruction	—	300
Newcastle-on-Tyne, Armstrong College :—		
Agricultural Instruction	960	950
Forestry ,, ...	—	250
Oxford, University of :—		
Agricultural Instruction	—	620
Forestry ,, ...	250	250
Reading, University College :—		
Agricultural Instruction	1,300	1,300
Agricultural Colleges.		
Cirencester, Royal Agricultural College :—		
Agricultural and Forestry Instruction ..	—	1,200
Holmes Chapel College of Agriculture and Horticulture :—		
Agricultural Instruction	—	350
Kingston, Derby, Midland Agricultural and Dairy College :—		
Agricultural Instruction	1,000	1,000
Newport, Salop, Harper Adams Agricultural College :—		
Agricultural Instruction	1,000	1,000
Scale-Hayne Agricultural College :—		
Agricultural Education	200	—
Swanley Horticultural College :—		
Horticultural Instruction	500	500
Uckfield, Agricultural and Horticultural College :—		
Agricultural Instruction	—	500
Wye, South-Eastern Agricultural College :—		
Agricultural Instruction	1,300	1,300
Special Institutions.		
British Dairy Institute, Reading :—		
Dairy Instruction	400	400
Harris Institute, Preston :—		
Agricultural Instruction	—	400
Bristol University Agricultural and Horticultural Research Station	450	450
Royal Horticultural Society's School, Wisley, Surrey :—		
Horticultural Instruction	—	250

Midland Agricultural and Dairy College at Sutton Bonington are also in military occupation, as well as those of Armstrong College, Newcastle-upon-Tyne, which have been in use as a hospital since the commencement of the War.

As was inevitable, the attendance of students for long courses at these Institutions (348) showed a further material falling-off from pre-war standards (1,200). On the other hand, the increase noted last year in the number admitted for short courses (665) was maintained, the special arrangements made for

TABLE II.—*Advisory Grants, 1916–17.*

Name of Institution.	Amount of Grant Provisionally Sanctioned in respect of the Academic Year ended 30th Sept., 1916.	*Amount of Grant Paid in	
		1916-17.	1915-16.
	£	£	£
Aberystwyth, University College of Wales	649	545	617
Bangor, University College of North Wales	877	1,067	624
Bristol, University of	900	474	1,146
Cambridge, ,, ...	860	645	605
Leeds, ,, ...	925	780	832
Midland Agricultural and Dairy College	410	348	346
Newcastle-upon-Tyne, Armstrong College	1,000	1,000	600
Reading, University College ..	980	954	913
Wye, South-Eastern Agricultural College	1,000	1,000	1,000
Total	£7,601	£6,813	£6,683

* The amount shown is the sum which was paid in the financial year. The Grants are sanctioned in respect of the academic year ending 30th September, but in order to meet the convenience of Institutions, payments on account are made from time to time, and the sum actually paid in the financial year in some instances includes amounts in respect of more than one academic year.

the training of women farm workers having been renewed. Scholarships, generally of four weeks' duration, were offered by the Board to provide training in light farm work for women selected by the local Women's Committees and most of the Institutions admitted pupils up to the limit of the accommodation available. In addition to these institutional courses, special arrangements were made by Local Education Authorities in many cases for the training of women on private farms, with results that have amply justified the experiment. At the end

of the year under review the responsibility for the organisation and training of woman agricultural labour was taken over by the Women's Branch of the newly-constituted Food Production Department.

The Grants shown in Table II., which come from the Development Fund, are made in respect of the salaries and expenses of Special Advisory Officers appointed by the Institutions named in pursuance of the Board's Agricultural Research and Advisory Scheme, to undertake local investigations and provide technical advice for farmers in the areas associated with the Institutions. The work of these officers is intended to supplement the activities of the County Agricultural Staffs, who are invited to refer to the Collegiate Centre any problems requiring more specialized knowledge or *ad hoc* investigation.

Grants to Research Institutes (Table III.) also owe their origin to the Development Fund. The policy pursued here has been to concentrate research on a particular subject so far as possible at a single Institution, and developments with a view to secure a greater degree of co-ordination of work on related subjects are now under consideration.

It would not be possible within the limits of this Report to give a summary of the work in progress at these Institutes, and those interested are referred, therefore, to the periodical publications issued by the Institutes themselves, either separately or in the scientific press. A summary of the investigations carried out last year at the Bristol University Research Station (*National Fruit and Cider Institute*), Long Ashton, appeared, however, in the June number of this *Journal* (p. 316); and the monthly Notes on Feeding Stuffs contributed by the *Animal Nutrition Research Institute* at Cambridge have continued to be appreciated by readers in want of a guide to the economics of war-time prices and substitutes.

The investigations conducted by Professor Biffen at the *Cambridge Plant Breeding Institute* continue to give results of far-reaching economic importance, opening out a new chapter in crop improvement. Recognition of the practical value of Professor Biffen's discoveries of the possibility of transmitting and combining desired qualities in different varieties of wheats is already forthcoming in the project for the establishment of a National Institute of Agricultural Botany, foreshadowed in the July number of the *Journal* and alluded to by Mr. Prothero in his speech in the House of Commons on the 18th of that month.*

* See this *Journal*, August, 1918, p. 522; also footnote (*) on p. 1005.

Less obvious, perhaps, though hardly less important, is the value of the researches in Plant Nutrition and Soil Problems conducted at the *Rothamsted Experimental Station* under the

TABLE III.—*Grants to Research Institutes.*

Subject of Research and Name of Institution to which the Grant was Paid.	Amount of Grant Provisionally Sanctioned in respect of the Academic Year ended the 30th Sept., 1916.	*Amount of Grant Paid in	
		1916-17.	1915-16.
Research Institutes:	£	£	£
Plant Physiology—Imperial College of Science and Technology	1,669	1,489	1,401
Plant Pathology—Royal Botanic Gardens, Kew	—	1,359	3,243
Plant Breeding—University of Cambridge	1,141	965	1,250
Fruit Growing — University of Bristol	2,520	2,495	2,785†
Plant Nutrition and Soil Problems—Rothamsted Experimental Station	2,850	2,587	2,450
Animal Nutrition—University of Cambridge	2,255	1,709	1,778
Animal Pathology—Royal Veterinary College	1,309	1,307	1,196
Animal Pathology—Board's Veterinary Laboratory	—	563	896
Dairying—University College, Reading	1,905	1,770	1,812
Zoology (Helminthology)—University of Birmingham ..	1,097	638	889
Zoology (Economic Entomology)—Manchester, Victoria University	579	560	559
Agricultural Economics—University of Oxford	1,000	1,000	1,000
Other Research Centres:			
Fruit Growing — South-Eastern Agricultural College, Wye (Malling Fruit Research Station) ..	500	500	625‡
Animal Nutrition—University of Leeds	1,000	500	1,200‖
Poultry and Rabbit Breeding—Cambridge University	188	168	122
Glasshouse Crops—Waltham Cross Experimental Station	500	405	750
Total	—	£18,015	£21,956

* See footnote to Table II.

† In addition, a Grant of £450 in respect of the Bristol University Research Station is included in the Statement of Higher Agricultural Education Grants.

‡ Includes Special Grant of £100 in respect of the deficit on the working of the Station in 1914–15.

‖ Includes £100 Capital Grant in respect of building Digestibility Laboratory.

direction of Dr. Russell. For example, the study of the reciprocal relationship of protozoa and bacteria in soils under natural conditions may lead to practical results of much importance; while such questions as the losses of nitrogen from farmyard manure heaps, the vitality of buried weed seeds, and the search for a satisfactory sterilising agent which will effectively control soil insect pests without injuring crops, have an obvious bearing on problems of actual moment, of which the breaking up of grass land necessitated by the present food conditions provides a considerable number.

This *Journal* for April, 1917, contains a Report on the Experiments on the Effect of Electricity on Plant Growth carried out during 1916 by the *Imperial College of Science and Technology*. These experiments, which gained a retrospective interest from the attention given to the subject in the general press in the early part of this year, were not conclusive as to the conditions under which the electrical effect (if any) is produced, and any recommendations for general adoption must await the result of the further trials now being carried out under the supervision of the Electro-culture Committee appointed by the President at the beginning of the year to advise on the engineering, meteorological and other problems involved.

Before passing from the Research Institutes it is a mournful duty to record the death, from wounds received in action, of three valued workers in agricultural science: Dr. Harold Ackroyd, R.A.M.C., who held the position of Physiologist to the Cambridge Animal Nutrition Institute from October, 1912, to September, 1914, and whose distinguished service at the Front gained him successively the M.C. and V.C.; Major P. G. Bailey, M.A., who, after completing the three-years Research Scholarship awarded to him by the Board in 1911, was working as Assistant to Professor Punnett in the Department of Genetics at Cambridge until the outbreak of the War, when he joined the R.F.A.; and Mr. E. W. Barton, B.A., another of the Board's Research Scholars, who obtained permission to postpone the completion of his course in Agricultural Economics, begun at Oxford University, in order to answer the call of patriotism.

There remains to be noted the educational work of the County Councils. Activities here were again directed mainly towards war problems, the agricultural staffs acting in close co-operation with the War Agricultural Committees. To the Executive Committees of the latter were delegated the statutory powers

and the services of the Agricultural Organiser were usually requisitioned as Chief Executive Officer. The functions of the Organisers in this capacity fall within the purview of the Food Production Department, which was instituted at the beginning of 1917, and their work receives appreciative notice in the Reports of that Department.

Of the itinerant work of the counties perhaps the most noticeable feature has been the work of the Travelling Cheese Schools, which, with the aid of sets of apparatus supplied by the Board, have done much to encourage the production of cheese from milk not required for immediate consumption.* A further development in this direction has been the establishment of Milk Co-operative Depots in selected areas; but progress under this head will be reported on in due course by the Dairy Branch, which was recently set up to deal with these matters.

The schemes for the distribution of eggs and day-old chickens to cottagers and small holders, first instituted in 1915, were continued successfully in the following year, and, despite the great difficulties encountered in obtaining supplies of feeding stuffs, it has been found possible to renew the arrangements in each subsequent year, though on a slightly reduced scale.

Of the other items shown in the final summary below, mention only need be made of the Capital Grants for Farm Schools, which were either for the completion of buildings already in an advanced stage, or for some special purpose which did not admit of postponement; the Grants towards Administrative Expenses of Advisory Councils, which were discontinued at the end of last year; and the Grants for Forestry Advisory and Research work, which went to the Universities of Oxford and Cambridge, University College, Bangor, and Armstrong College, Newcastle-upon-Tyne. Forestry work at all these Institutions has, however, been necessarily curtailed owing to the employment of the staffs on the work of the Timber Supplies Department of the Board of Trade.

Grants made from the Development Fund *through* the Board, though they do not appear in the above tables, call for mention as part of the administrative responsibilities of the Branch. The most important of these subsidies was a loan of £130,000 advanced to the British Sugar Beet Growers' Association for the purchase of the Kelham Estate of about 5,600 acres, near Newark, with a view to the institution of an experiment in the

growing of beet and the manufacture of sugar on a commercial scale after the War. Grants were also made to the twin Society for the Cultivation of Flax and Hemp, the operations of which are now directed by the Flax Production Branch; and to the Land Reclamation Society for preliminary surveys of Borth Bog, in Merionethshire, and Otmoor, in Oxfordshire, with a view to collecting data on which to form an opinion as to the economic possibilities of winning these areas back to cultivation.

The purposes to which the Grants of 1916–17 and the corresponding Grants of 1915–16 have been applied were :—

	1916-17. £	*1915-16.* £
Educational Grants to Universities and Colleges	11,960	16,120
Grants for Advisory Work	6,813	6,683
Grants to Research Institutes and other Research Centres	18,015	21,956
Grants for Special Research and other Investigations (including Miscellaneous Development Schemes and Emergency Experiments)	7,470	6,371
Research Scholarships (including Expenses of Selection)	658	1,796
Grants for Farm Schools, Technical Classes, Local Lectures, etc.	26,221	27,908
Capital Grants-in-Aid of the Establishment of Farm Schools	1,574	13,594
Grants towards the Expenses of Advisory Councils	915	1,160
Grants for Forestry Advice, Research and Experiments	2,551	3,058
	£76,177	£98,646

INJURIOUS WEED SEEDS IN GRASSES AND CLOVERS HARVESTED FOR SEED IN BRITAIN.

Introduction.—The Testing of Seeds Order, 1918,* in addition to providing for a declaration of the germination and purity of certain agricultural and horticultural seeds, also makes it necessary to declare the presence of certain weed seeds in grasses and clovers when the percentage of these exceeds 1 per cent. The plants, the seeds of which must be so declared, and which are scheduled as injurious, are the following: Docks and Sorrels (***Rumex*** spp.), Cranesbills (***Geranium*** spp.), Wild Carrot

(*Daucus Carota*, L.), Yorkshire Fog (*Holcus lanatus*, L.) an soft Brome Grass (*Bromus mollis*, L., et. spp.).

The presence of Dodder (*Cuscuta*, spp.) in clovers must also b declared.

Need for Special Care in Growing Seed.—It is probably not full realised by farmers that great waste of good seed is involved i the cleaning of samples of grasses and clovers that are harveste with excess of weed seeds. Further, cleaning processes ar expensive, and may entail serious delay in placing seeds on th market, while they add considerably to the price farmers hav to pay for good, clean seed.

It should be obvious to all who grow crops for the productio of seed that **the best and most economical means of producing clea seed is to grow clean crops. This entails the preparation of a clea seed bed, the use of clean seed, and subsequent eradication of weed in the growing crop.** It may be admitted that the eradicatio of weeds from clover and grass leys is a difficult matte but it may, nevertheless, be undertaken, particularly in th case of certain weeds. A clean seed bed and pure paren seed are undoubtedly the first essentials in the production o grass and clover seeds. It must be acknowledged that Britis farmers do not give the same attention to this importan question as do growers in some other countries, and that, a a consequence, farmers themselves sow much very dirty an uncleaned seed, and home-grown seeds invariably take mo cleaning than many of the imported stocks.

The value of Irish and Scotch Rye-grasses, Scotch Timoth Irish Crested Dogstail and English Trefoil, Sainfoin, Red an White Clovers, as herbage plants is well established, an consequently the necessity for producing clean harvests o these cannot be too strongly emphasised.

The uncertainty of the British climate is partly responsibl for the lack of attention paid to the production of gras and clover seeds. Fields are seldom sown with the definit intention of harvesting a crop of seed. Whenever seed i harvested in favourable seasons, however, **farmers should neve sow home-produced grasses and clovers without first sending th seed to a reliable merchant to be cleaned; or, even if their see appears from inspection to be clean, a sample should be sent to th Seed Testing Station to be reported upon before it is used. This ru should be applied to all seeds grown by farmers for their own use**

The Importance of Clean Seed.—The importance of using clea seed may be the better appreciated when it is stated that a large number of weed seeds may be introduced on to the lan

by sowing grasses and clovers containing only 1 per cent. of any particular harmful weed.

The following figures are given as examples* :—

Weed Seeds.	*Approximate Number of Weed Seeds present in 1-lb. Samples of Grasses or Clovers containing 1 per cent. of any such Weed Seed.*
European Clover Dodder	18,000
Chilian Dodder	7,300
Dock	3,200
Sheep's Sorrel	10,500
Cut-leaved Cranesbill	1,900
Smooth Cranesbill	4,500
Wild Carrot	4,400
Yorkshire Fog (in glumes)	8,900
Yorkshire Fog (without glumes)	12,700
Soft Brome Grass	1,500

It should be noted that germination tests conducted at the Seed Testing Station on weed seeds contained in samples of grasses and clovers show that the capacity for growth of such seeds is usually high, and often higher than that of the samples containing them. If, for example, 20 lb. of Rye-grasses and 10 lb. of Red Clover were sown to the acre, and if this mixture contained only 1 per cent. of injurious weed seeds, and if only half of these seeds germinated, and again if only half of those which germinated produced plants, none the less at least 7 weeds would have been introduced on every square yard of the field.†

Weed Seeds Met with in Rye Grasses and Clovers.—The following particulars as to the weed seeds most commonly met with, and which are the most troublesome to remove from British-grown stocks, should be of interest to seed producers.

THE RYE-GRASSES.—The most difficult seeds to remove from the Rye-grasses are Soft Brome, Yorkshire Fog (especially when the seeds of this grass are large and well developed), and Rats Tail Fescue, or Squirrel Tail as it is often called. The two former are bad weeds of temporary leys. Buttercup and Cats Ear are also frequently-occurring weeds. The proper cleaning of Rye-grasses often entails a waste of from 5 to 15 per cent., the removal of Yorkshire Fog in particular necessitating the loss of a certain proportion of the finest grass seeds. French seed and that grown in the Fens are usually comparatively free from Yorkshire Fog and Soft

* See Leaflet No. 297.

† See Report on Seeds Purchased in Central and South Wales, Seasons 1915–16, *Journal of the Board of Agriculture*, Vol. XXIII., No. 9, pp. 845–846.

Brome. English Italian Rye-grass often contains the seed of campions in moderate quantity, but these are not difficult to remove from this grass.

RED CLOVER.—This seed is frequently harvested in a very dirty condition, perhaps especially in Wales and in the West of England. The most commonly-occurring weeds are Ribgrass, Cut-leaved Cranesbill, Wild Carrot, Campions, Docks, and Thistles. Of these Cut-leaved Cranesbill, or "Rollers" as it is often called, and Ribgrass are probably the hardest to remove. The waste may be as high as 60 per cent., and samples with as much as 40 per cent. of Cut-leaved Cranesbill are sometimes met with; the average wastage varies from 5 per cent. to 20 per cent., and will depend to a considerable extent on the degree of development of the Ribgrass and Cranesbill, this being, of course, affected by the season. In many districts Cut-leaved Cranesbill is more plentiful in Single-cut Cowgrass than in other Red Clovers, the seed of this variety of Red Clover ripening at the same time as the Cranesbill. Docks are also difficult to remove completely, but with modern machinery Docks, Wild Carrot and Campions do not present the same difficulties as formerly, though their elimination entails waste. Dodder is not so general in English as in foreign Red Clover, but when it occurs it is difficult and expensive to remove completely.

WHITE CLOVER.—This clover, like Red Clover, frequently contains an abundance of weed seeds difficult to remove. The most troublesome are the Soft Cranesbill, Sheep's Sorrel, Small Ribgrass, Self Heal, Docks and Campions. Soft Cranesbills are particularly difficult to clean out of White Clover; they may sometimes constitute 50 per cent. of the bulk of the sample, and it frequently happens that they are responsible for a wastage of about 20 per cent.

ALSIKE CLOVER.—There is not a great amount of Alsike grown for seed in this country. It is harvested later than White Clover, after the Soft Cranesbills have shed the bulk of their seed, so that these seeds do not present the same difficulties as with White Clover. Self Heal and Sheep's Sorrel frequently entail a moderate amount of waste in the case of Alsike.

TREFOIL.—This seed is generally grown in a state of greater purity than other herbage plants. The seed has, moreover, to be milled to remove the husk or "cosh" and it is easily cleaned both before and after milling. Campions, Field Madder and Cut-leaved Cranesbill sometimes give trouble, but the

waste connected with cleaning Trefoil is not usually great, and this partly accounts for the relative cheapness of the seed.

SAINFOIN.—Seed in husk is frequently infested with Burnet, and Soft Brome grass is also a common impurity, both of these weed seeds giving trouble in cleaning. They are, however, more easily removed from milled samples.

The amount of waste involved in cleaning and dressing seeds will, of course, largely depend upon the season. In wet seasons much damaged and poorly-developed seed has also to be removed. In extreme cases nearly 50 or even 70 per cent. of weed seeds, dirt, and damaged seeds, may have to be removed, and of grasses and clovers in general, it may be said that the waste in dressing home harvests is seldom less than 2 per cent.; while the wastage will vary from about 5 to 25 per cent.

The Eradication of Harmful Weeds.—The following notes are given as to the means which may be employed for the eradication from growing crops of those weeds which are scheduled as injurious in the Testing of Seeds Order. It must be again emphasised, however, that every care should be taken in the first instance to avoid sowing the seeds of these weeds with the grasses and clovers.

DODDER.*—Dodder does not usually occur in clover leys in the North of England, but is common in the Southern Midlands, and in the Southern, Eastern and Western Counties. When Dodder appears in a clover crop the patches should immediately be cut with a scythe, taking the Clover and Dodder together. Care should be taken to cut the patches beyond the apparent limit of the Dodder. The Clover and Dodder should be collected into heaps and covered with chaff and straw and burnt. Dodder is usually most plentiful in the aftermath; consequently, when Dodder has made an appearance in the first crop, the aftermath should always be kept closely grazed and on no account should a second cut be taken or the crop harvested for seed.

DOCKS.†—Docks are liable to occur on leys on practically all soils. They should be cut to prevent the seed ripening. This will not, however, kill the plants. The only satisfactory plan is to dig up every dock plant by the roots, since in the case of this plant new stems are developed from the roots left in the ground.

SHEEP'S SORREL.†—Sheep's Sorrel is most common on leys on peaty soils, and on sands and on non-calcareous soils

* See also Leaflet No. 180 for a fuller account of Dodder and its Eradication.

† See also Leaflet No. 253 (*Some Common Weeds*, I.) for a fuller account

generally. This plant cannot be removed from young leys by any economical means of cutting or digging out. The only plan is to lime the land and so gradually improve the condition of the soil, and to include in the seeds mixture plants like Wild White Clover which will tend to crowd out the Sheep's Sorrel.

WILD CARROT.*—This plant is particularly abundant on dry calcareous and loamy pastures, but also in some districts abounds on heavy clays. Wild Carrot ripens its seed late and, therefore, usually does so in the second or aftermath cut.

Where Wild Carrot abounds, crops should not be cut for seed or a second time for hay; the aftermath should be grazed and the field run over with a machine with the knives set fairly high so as to cut off the flower heads before the seeds ripen.

CRANESBILLS.—The Cut-leaved Cranesbill is most plentiful on leys on heavy soils, but also abounds elsewhere. The Cut-leaved and Smooth Cranesbills are most frequently met with on calcareous and loamy soils. It is impossible to eradicate the Cranesbills by any economical means, and leys infested with these weeds should not be set aside for the purpose of harvesting seed. If these weeds are plentiful in fields from which it is for any special reason imperative to harvest seed, it might, in some cases, be practicable to dig up the plants with a fork before the field is put up to hay. As an alternative measure after the crop has been cut, it might be found possible to pick out the Cranesbills by hand from the swaths. These plants have red stems which would render them easily recognisable.

YORKSHIRE FOG AND SOFT BROME GRASS.—Both of these grasses are very difficult to eradicate from leys. The only practicable means is to cut the hay very early before these grasses have ripened their seed; this is, however, impracticable in the case of rye-grass harvests required for seed. In the case of Perennial Rye-grass, however, this procedure might be adopted in the first year, the seed harvest being postponed until the second year.

Notes on the Indentification of the Weeds Scheduled as Injurious in the Testing of Seeds Order.—DOCKS AND SORRELS.—The Docks and Sorrels belong to the genus Rumex (Natural Order *Polygonaceæ*). The characteristic features of this group of plants are the thickened perennial rootstock, erect stems which die off each autumn, leaves with thin stipules, and numerous small

* See also *Journal Bd. Agric.*, July, 1912, p. 273.

green flowers which usually become reddish on ripening The seeds of all the species are spindle-shaped, triangular in section and have a brown, shining surface When occurring as impurities in seed samples these seeds are sometimes covered with the withered remains of the flower.

The commoner Docks have large, fleshy roots, tall stems 2 to 3 ft. high, and broad leaves rounded at the base. Their seeds are about one-tenth to one-twelfth of an inch long and light brown to reddish brown in colour. Seeds of Dock occur commonly in Red Clover and not infrequently in Trefoil, Crimson Clover and Wild White Clover. Sheep's Sorrel is a smaller plant with horizontally-spreading, stringy roots, and small leaves with pointed basal lobes. The seed of Sheep's Sorrel is about one-twenty-fourth of an inch long, reddish-brown or yellowish-brown in colour, somewhat translucent, and commonly surrounded by the withered flower remains. It is a fairly common impurity in Alsike and Timothy (especially North American samples), and is also found in White Clover and Red Clover.

CRANESBILLS.—The Cranesbills are species of the genus Geranium (Natural Order *Geraniaceæ*). They are low, straggling herbs, with branched stems, more or less divided leaves, and small, purplish flowers. The two commonest types are the Cut-leaved and the Soft Cranesbill.

The Cut-leaved Cranesbill or Robin is a branched annual with very dissected leaves. Its seeds are one-twelfth to one-sixteenth of an inch long, oval, greyish-brown, with markings similar to those of a thimble. It is a common impurity in English Red Clover, Crimson Clover and Trefoil. The Soft or Dovesfoot Cranesbill is also an annual, but it is smaller less branched, and more hairy than Cut-leaved Cranesbill and its leaves are less divided. The seeds are about one-twentieth of an inch long, oval-cylindrical, light chocolate-brown in colour, and quite smooth. It is a very common and troublesome impurity in White Clover seed, but is not much found in the other Clovers.

WILD CARROT.—(Natural Order *Umbelliferæ*). The Wild Carrot needs little description as it is very similar to the cultivated form. It has, however, less root and leaf development, and more often behaves as an annual, forming seed the first year. The fruit (" seed ") is practically indistinguishable from that of the cultivated carrot and occurs fairly commonly in Red Clover, more particularly, however, in samples which have been grown in France.

YORKSHIRE FOG.—(Natural Order *Gramineæ*). Yorkshire Fog is a tufted or slightly-creeping perennial grass, with greyish green leaves which are thickly covered with soft, velvety hairs. The flower heads are more or less spreading and almost always have a characteristic pinkish tinge. The form of "seed" which occurs so commonly in Rye-grasses is the flattened, oval spikelet, consisting of two chaffy glumes and the contained kernel. The "husked seed" is fairly common in Wild White Clover, and is also an impurity of Alsike and ordinary White Clover.

SOFT BROME GRASS.—(Natural Order *Gramineæ*). There are several closely allied forms which come into this group. They are mainly annuals with a tufted habit and slightly downy leaves. The spreading flower heads bear a comparatively few large spikelets. The awned boat-shaped seeds are very common in samples of Rye-grasses, but can be distinguished from seeds of Italian Rye-grass by the wider and more flattened top to the seed and the fact that the awn arises in a notch just below the apex of the seed.

Farmers who intend sending their seeds to the Seed Testing Station should comply with the following regulations :—

Size of Samples to be sent :—

Broad Beans and Scarlet-runner Beans	8 oz.
Peas and Dwarf French Beans	6 „
Wheat, Oats, Barley, Rye, Vetches, Red Clover, Crimson Clover, Trefoil, Lucerne, Sainfoin ..	4 „
Grasses, Alsike, White Clover, Mangolds, Beet, Turnip, Swede, Rape, etc.	2 „
All Vegetables, except Beet	½ „

Fees.—When the result of the test is required for the farmer's own information the fee is 3*d.* per sample ; when the result is required for the purpose of making a declaration in respect of a sale the fees are : Cereals, 1*s.* per sample ; Vetches and Vegetable seeds (except Mangolds and Beet), 1*s.* 6*d.* per sample ; Mangold, Beet, Grasses and Clovers, 2*s.* per sample.

Envelopes.—Special envelopes may be obtained free of charge on application to the Director-General, Seed Testing Station, Food Production Department, 72, Victoria Street, London, S.W. 1, to which address samples should be sent.

USEFUL FARM WEEDS.

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THE useful properties of "weeds" and wild plants generally have long been recognised, and though with the progress of civilisation cultivated plants have tended to supplant the wild species, the latter have never quite fallen into disuse. At the present time, owing to the abnormal circumstances created by the War, the old uses are being revived and in various ways the weeds are helping to make up deficiencies of supply. Numerous experiments have been carried out since the War began, especially with bracken and heather, and the experience thus gained has been put to practical use. Bracken and heather cannot strictly be considered as farm weeds, and as they have frequently been dealt with in the pages of this *Journal* and elsewhere, it is proposed in the present article to draw attention to the uses of the more ordinary farm weeds, classified under their appropriate headings.

Medicine.—For many centuries wild plants played a chief part in the provision of medicines and drugs. In the early herbals almost every weed had special healing virtues attributed to it, many of which had little foundation in fact. With the advance in medical knowledge most of the wild "drugs" fell into disrepute, but a few retained their position in the *materia medica* of the day, though they were usually obtained from cultivated stock. At the present time there has been a revival in herb gathering, and there is a steady demand for the organised collection of certain species of such weeds, especially important ones being meadow saffron, deadly nightshade, foxglove, and henbane.

Dyes.—In the days before chemical dyes came into use, and before cheap vegetable dyes were imported in large quantities from foreign countries, wild native plants were the chief source of colouring matters. Yellow dyes were obtained from the tops of ladies' bedstraw (*Galium verum*) and agrimony (*Agrimonia eupatoria*), from the roots of nettles (*Urtica dioica*), and from dyer's greenweed or wood-wax (*Genista tinctoria*) and dyer's rocket (*Reseda luteola*), while the roots of sorrel (*Rumex Acetosa*) and ladies' bedstraw (*Galium verum*) provided red dyes. No general revival has taken place in the use of these plants, though they still seem to be used locally, especially in

Poppy petals are valued on account of the fine red colouring matter they contain. This can hardly be classed as a dye, but it is much used as a colouring agent in pharmacy.

Fodder.—By far the most important uses of weeds are in connection with the food of men and animals, and considerable development has taken place in these directions during the last four years, especially with regard to substitute fodder plants. Weeds and weed seeds are being used as green fodder, hay and cake, and are proving of much value.

Couch grass (*Agropyron repens*) was recognised as a valuable feeding stuff as early as 1804, when Hunter* stated: "Hogs, and I believe all kinds of cattle, will eat it greedily in its green state, and when dried it makes a very nourishing hay." As a matter of fact, horses and cattle eat it readily. Within the writer's experience in 1916 a rick of couch grass rhizomes was completely demolished by cattle that were turned into a field, though never a handful was fed to the beasts. If the couch rhizomes could be separated cheaply from soil and dirt they would furnish a very useful cattle food, as they contain both albumen and sugar. In recent German experiments † the stuff has been threshed and dried, forming couch hay, and it is claimed that this resembles good meadow hay in feeding value, yielding on analysis 10·37 per cent. crude protein, 4·93 per cent. digestible protein, 1·36 per cent. fat.‡ In Sweden it is used, after being dried and chopped up, for feeding pigs, and, as a variant, the food is prepared by boiling the couch with dandelion roots.

In this country spurrey (*Spergula arvensis*) is looked upon merely as a pernicious weed, but on the Continent it has long been known as a valuable fodder, and has been cultivated for the purpose.§ In 1787 Abbé de Commerell described the method of sowing spurrey on stubble directly after corn harvest, thus providing a plentiful supply of fodder within five or six weeks. Nowadays, two crops a year are raised in the Low Countries, the first from a May sowing which ripens seed in August, and the second from seed put down after rye harvest, which provides feed until the New Year. The crop is either used as pasture, or is cut and fed green or made into hay.

* *Hunter, Georgical Essays, III., p. 134 (1803); VI., p. 176 (1804).*

† Strecker, Summ. in this *Journal*, XXV., pp. 330–331.

‡ An earlier analysis gave 15·30 per cent. water, 7·15 per cent. nitrogen compounds, and 34·80 per cent. soluble feeding constituents (mucilage, sugar glucose and other easily-digested materials). See Hughes, *Jour. Bath and West* [illegible]

giant variety is often sown, but our ordinary native species the better as regards nutritive value. Spurrey is said to particularly good as feed for milking-cows, as it improves eir milk and butter, and it is much relished by horses, cattle, eep, poultry and pigeons. The seeds of the plant, when ruised, provide yet another kind of useful food.

Experiments have been made in Germany* to test the feeding alue of certain common weeds, with good results. Bindweed, *Convolvulus arvensis*), fat hen (*Chenopodium album*), chickeed (*Stellaria media*), creeping thistle (*Cirsium arvense*), and owthistle (*Sonchus oleraceus*) all have considerable nutritive alue, especially for milking-cows, and no harmful effects have esulted from feeding them in quantity. It is suggested that when these weeds are used for feeding purposes they should not be cut too near the ground, in order to avoid the inclusion of dirt and stones. When dried these plants are credited with having a higher feeding value than red clover and lucerne, hough they are not so nutritive when fresh. Bindweed seems o be the richest in food constituents.

Some years ago bent grass (*Agrostis stolonifera*) was grown rather widely as a fodder grass, but this is now less frequently the case. In Italy and the South of France it was a usual practice to gather the creeping stems into bundles, and to sell them in the market as horse provender.

Various other weeds play a useful, though minor, part in the provision of green fodder. Hogweed (*Heracleum sphondylium*) fattens hogs well, and is liked by cattle. Knotgrass (*Polygonum aviculare*) is greedily eaten green by pigs, so that in some counties it also receives the name of hogweed. An allied species (*Polygonum lapathifolium*) (a British species) was much used in Germany during 1914† and probably since, especially as a food for milch cows. No ill effects on the health of the animals have been observed, and, according to analysis, the food value approximates to that of rye-grass and cocksfoot.

Dandelion leaves and sowthistles are much appreciated by small stock, such as hares, rabbits and goats, and the leaves of silverweed (*Potentilla anserina*) are one of the favourite foods of geese. One old fodder plant, however, seems to have entirely fallen into disuse. Banister stated in 1799‡ that when large quantities of poppies appeared among wheat crops it

* Kling, M., *Landw. Versuchs-stat.*, LXXXV., pp. 433–470. See this *Journal*, XXII., p. 362.

† Störme und Klein, *Deutsche Landwirtsch. Presse*, 1914, No. 80, p. 890.

‡ Banister, J., A Synopsis of Husbandry, 1799, pp. 77–79.

was usual to turn in droves of hogs in May, thus maki clearance of the weed, but it is doubtful if this procedu ever followed nowadays.

Some weeds are more useful after they are dried or r into hay. Most animals will not touch growing nettle account of the stinging hairs, but after the plant is cut and c these hairs collapse and lose their virulent property. In condition they are readily eaten, and are said to improve milk and butter of cows and to increase egg productio poultry. Nettles form a very useful crop for growing in w ground that cannot be utilised in other ways, provided not too dry. They will resist considerable extremes of tem ture, and three cuts a year can be taken. The Swedes grown nettles for forage for many years and the compos is said to resemble that of the best meadow hay.

In France, Italy, Switzerland and other parts of Eu chicory (*Cichorium Intybus*) is cultivated for stock especially for cows, and is usually made into hay. Ger experiments indicate that the dried chicory roots (chi crumbs) make an excellent substitute for oats as they co much carbohydrate, including over 4 per cent. of su Horses may safely receive up to 10 lb. of the dried roots per head. Wild radish husks have also been used as s feed by the Germans during the War. The nutritive val about 40 per cent. that of good barley, and cattle and h appreciate the husks, but they are not suitable for pigs.

Although gorse can hardly be considered as a usual farm it may be mentioned here that it forms a most excellent fo provided that the older branches are bruised with a m before being fed. Cattle, milch cows, sheep and horse thrive well on it, and in the Scilly Islands the gorse on the forms the chief means of subsistence for the island ponies

In the course of such farm operations as stacking and th ing large amounts of rubbish containing an abundance of seeds are apt to accumulate on a farm. In Canada enor quantities of screenings are produced when the wheat is pared for export, and special methods of crushing and separ have to be used to get rid of some of the weed seeds. M of these screenings are considered to be useful for animal and this receives corroboration from German analyses. seeds of black bindweed (*Polygonum convolvulus*) are similar to those of buckwheat, and the resemblance exten the feeding value. The seeds of various species of beds

* See also this *Journal*, August, 1915, p. 455, as to the use of go

including *Galium aparine* and *G. tricorne*, are quite good as cattle food, but as they are so hard it is advisable to grind them before feeding. They contain 1 to 2 per cent. of oil, but it is difficult to extract this as it is so finely divided up in the tissues. Charlock seeds are also used occasionally, but are not altogether safe. It is said that they should be ground and cooked before feeding in order to avoid the danger of the formation of cumulative small amounts of oil of mustard in the stomachs of the animals.

The cake or residue left after the oil has been expressed from poppy seeds forms a nutritious food for cattle. Another cake is obtained in the same way from the seeds of gold of pleasure (*Camelina sativa*), but as it possesses acrid properties its suitability as cattle food is rather doubtful.

Human Food.—Many of the weed substitutes for fodder are so effective and so abundant that it is probable that their use will survive the immediate urgency of the moment. Most of the weeds used for human food, however, can only be considered as emergency rations, and it is doubtful whether the majority of them will continue in use when the present food shortage is over. The chief exceptions to this remark are chicory (*Cichorium Intybus*) and salep (*Orchis mascula*).

During the eighteenth century chicory roots were gathered for eating before the flowering stems shot up, and were sometimes dried and made into bread. Nowadays they are chiefly used as an adulterant or substitute for coffee, being kiln dried or roasted, and ground into powder. In Belgium chicory has long been used in a pure state instead of coffee, and in the same country the roots are boiled and eaten like parsnips. When bleached the leaves are used for salad.

"Salep" is a very nutritious food substance which enters largely into the diet of the people of Turkey, Persia and Syria. It is manufactured from the roots of *Orchis mascula*, which is an abundant weed in the moist meadows of Gloucestershire and other parts of England, and is much cultivated in the Orient. The root is heated and dried in the air, and the product is a rather horny substance, credited with containing much nutritious matter in a small bulk. It is occasionally added to bread in certain proportions.

In times of scarcity brought about by the failure of crops or the conditions of warfare the provision of a sufficiency of bread becomes one of the most pressing problems. The need for eking out meagre supplies of grain is urgent, and many and varied are the substitutes that have been tried with greater

or less success. In this country we have not been brought to such a serious pass, and we have been able to deal with the situation by utilising various types of grain and potatoes in addition to wheat. In other belligerent countries, however, there is no doubt that the difficulty is much greater, and many preparations of weeds, straw, and even wood have been tried as means of supplying the deficiency.

During the Thirty Years War the rhizomes of couch grass were dried and ground into meal for bread making, and this use has been revived in Central Europe during the last four years.* Even before the War bread made from common sorrel (*Rumex Acetosa*) was often used by the poor people of Sweden at times when it was difficult to grow an adequate crop of barley or rye.

The bitter, milky roots of sowthistle (*Sonchus oleraceus*) have been used similarly. The roots of silverweed (*Potentilla anserina*) are quite nutritious, and have provided a substitute for bread for the people of Tiree and Coll, who, in times of scarcity, have for months had to depend almost entirely upon them as a means of subsistence.

The seeds of some weeds can also be made into a flour substitute or addition. Spurrey seeds, ground and mixed with rye or wheat flour, make quite a good bread, and they are often used for this purpose in Norway and Finland, particularly if other crops are short. It is probable that the seeds of fat hen (*Chenopodium album*) might be employed in the same way. *Chenopodium quinoa*, a very closely-related species, has been cultivated for food purposes in Peru and Chili from very ancient times, and the seeds have been manufactured into flour. The relationship and the chemical composition of the two species are so close that there seems little reason why fat hen could not be applied to the same purpose. As a matter of fact, the Russians did make bread from rye flour and *Chenopodium* seeds during the famine of 1891–2, and it is probable that these were seeds of our own species *C. album*.

Some weeds that are useless as bread substitutes may help to supplement the vegetable supply, though with the great increase in allotment gardening in this country it has not been necessary to use wild vegetables to any appreciable extent. The Germans have apparently been making yet another use of the ubiquitous couch grass, by cooking the rhizomes like asparagus. In some parts of England, especially in the west around Bath, the spiked Star of Bethelehem (*Ornithogalum pyrenaicum*) is

* In Italy a starchy powder has been prepared from the rhizomes of couch grass, which closely resembles arrowroot, and can be used satisfactorily for human food. See also note in this *Journal*, June, 1918, p. 330.

very abundant, and is gathered and sold in the local market for use instead of asparagus, and is much esteemed. Earth-nut (*Conopodium denudatum*) is another of our common pasture weeds that might be worth developing, as it is both nutritive and palatable, though it is little known and much neglected. The tuberous roots were eaten by the Dutch people in the seventeenth century as we eat parsnips and carrots. They are still so eaten in Holland and the Alps, and are said to resemble chestnuts in flavour. In parts of England they are sliced and put into soups, while in Sweden they are widely used and are indeed a regular article of commerce. If cooked like Jerusalem artichokes they are very palatable and easily digested. It has been suggested that even if earthnuts are not directly consumed as food, they might prove a remunerative source of starch or glucose.*

The tops of young nettles and also of wild garlic (*Allium ursinum*) make excellent substitutes for spinach, though the latter needs to be thoroughly scalded twice to remove the strong garlic smell. The Germans have been experimenting since the outbreak of War with nettles and have now begun to cultivate them as food.

Substitutes for tea and coffee are many. Some of them have been known and used in out-of-the-way country districts for many years, but the cessation of imports into Germany has brought them into prominence. Chicory is a permanent substitute and has been described above. Once again couch grass is used, the rhizomes being washed, dried, and minced before roasting and grinding. The roots of dandelion, sowthistle, John-go-to-bed-at-noon (*Tragapogon pratensis*) and bracken are all treated and used in a similar way, and in Germany a new company has even been formed to promote the use of the roots of reeds as a coffee substitute.

For tea the leaves of meadow-sweet (*Spiraea ulmaria*), ground ivy (*Glechoma hederacea*), agrimony (*Agrimonia eupatoria*), sweet vernal grass (*Anthoxanthum odoratum*), and the flowers and calyx of cowslip (*Primula veris*) have all been used at different times and places. The leaves of the narrow-leaved willow herb (*Epilobium angustifolium*) have long been used in Russia for mixing with ordinary tea.

Manures.—When weeds have to be removed from the land the problem arises as to the best way of disposing of the rubbish, as if it is pulled up and left lying about it becomes a nuisance

* Crichton Browne, J. A Neglected Source of Food Supply. 1917. *Selborne Magazine*, XXVIII., pp. 85–87.

and a menace. A simple way out of the difficulty is to bury the material, utilising it as a green manure, and this practice has been very generally followed throughout the history of agriculture. When a weedy stubble or fallow is ploughed up the weeds are buried some inches deep, and they decay and return their valuable plant foods to the soil. On light, sandy soils a useful method of eradicating spurrey is to turn it in, with much benefit to the soil; in fact some foreign writers recommend that it should be sown for the purpose. German analyses of such common weeds as bindweed, chickweed, fat hen, sowthistle, etc., have shown that many of them are rich in plant food, especially nitrogen and potash. Chickweed and fat hen contain a very large proportion of potash (10·9 per cent.), so that they have a considerable manurial value.

When large quantities of weeds are gathered by the harrow it is unwise to leave them scattered by the side of the field on account of the danger of seed dispersal. If it is possible to cart them away, they may be mixed with lime, and will then rot down into a useful compost that will supplement the supplies of farmyard manure. A still better plan, if it can be carried out, is to burn the weeds straightway in heaps on the field and to spread the ashes over the land. This conserves the valuable potash to a great extent, and the soil is correspondingly benefited. Couch grass is very useful when treated thus. Its composition varies with the soil on which it grows, and, generally speaking, the richer the soil the richer the ashes. On sandy land that is infested with bent grass (*Agrostis* sp.) it is the usual practice to harrow it into heaps and burn it.

The ashes from burnt gorse are very rich in alkali and are valuable as manure, especially on peaty soil.

Fibre Plants.—A few weeds have some economic value on account of the fibre they contain, the common nettle being the most important of these. The stems contain a large proportion of fibre, and at different times and places this has been utilised to manufacture all kinds of material ranging from ropes and cordage to the finest white linen and sewing cotton. The ancient Egyptians used it a great deal in the manufacture of textile fabrics,* and it is probably still made into cloth in parts of Italy, while the inhabitants of Siberia depend upon the nettle for their supplies of fishing lines and cordage. This use of nettles has been revived in recent years, as in 1911 a Vienna firm discovered a practical way of removing the gum from the

* Hogg, R., and Johnson, G. W.: *Wild Flowers of Great Britain*, 1862.

fibre of *Urtica dioica* and *U. urens,* enabling a yield of about 13 per cent. of pure bleached fibre to be obtained from the plants. It is claimed that the fibre is supple and flexible, with a gloss like that of silk.

The stems of gold of pleasure (*Camelina sativa*) are very tough and fibrous, and in countries where it is abundant or cultivated they are utilised for such purposes as thatching and for making brooms, sackcloth, sailcloth and packing paper. The common rushes of our damp fields have fallen into disuse, but in this country mats and chair bottoms were formerly manufactured from them; they were worked up into baskets of all descriptions, from coarse fishing baskets to finely woven ware, and the pith provided material for making " rush lights " before the modern candle was introduced.

Recent experiments have shown that the fibres from the rhizomes of couch grass are quite suitable for paper-making if the initial difficulties with regard to the expense of collection and cleaning can be overcome.

Miscellaneous Uses.—The screenings from large bulks of wheat often contain large quantities of seeds of fat hen and charlock, the latter being rich in oil, and it has been suggested that these might make a profitable fuel if they were mixed with coal. Gorse is often used in country districts to heat the large brick ovens, as it is easily obtained and burns with a great heat.

The various species of horsetail have a deposit of silica in their outer layers, which makes them valuable as scouring agents. Both in this country and America, and probably elsewhere, the horsetails are used for polishing tin ware and brass, and one special variety, under the name of Dutch rushes, was imported into this country as it is particularly good for the purpose. Another rustic use of a weed, common to England and Sweden, is to employ the rough stems of goosegrass (*Galium aparine*) as a filter for straining milk. In the manufacturing world, too, the mucilage from the seeds of various species of plantains (*Plantago* sp.) is valued for stiffening muslins, while the seeds of fat hen are used in the manufacture of shagreen to give the pitted appearance characteristic of that leather.

From this outline sketch of the uses of farm weeds it is seen that these plants, generally regarded as useless encumbrances of the ground, may take a definite place in the economics of the country if they are utilised in the right way. The most promising outlook is with regard to forage, and while many uses are almost certain to fall into abeyance as soon as

conditions become more normal, it would be advantageous if some of the more valuable weeds were to retain their position as fodder plants long after the War is over.

ECONOMY IN THE USE OF HAY.

The Need for Economy.—The great extension of the area devoted to the grain and potato crops this year has involved serious inroads upon the area of grass land which would otherwise have been used for the production of hay. The hay area (permanent grass and rotation grasses) in England and Wales this year is 731,000 acres less than in 1917, and it is probably not far wide of the mark to say that this year's hay crop in England and Wales is fully 800,000 tons short of last year's, and 1,100,000 tons short of the average crop for the past ten years.

In the face of the foregoing figures, and the increase over pre-war requirements occasioned by the needs of the Army, it is obvious that the most rigid economy in the use of hay will need to be practised *all round* throughout the coming winter. To the farmer with a short crop of hay the need for economy will be sufficiently obvious, and it will be brought home more and more sharply to all as the demands of the Military Authorities make inroads upon the supplies of those more fortunately circumstanced.

Farmers are often reluctant to part with their hay because they do not consider they can replace it by any other food so cheaply. But now that hay is £8 per ton the farmer who can obtain offals or cake under the rationing scheme for feeding stuffs will not find it profitable to attempt to do all his feeding on hay. These concentrated foods have twice the feeding value of hay and to the extent they are procurable at prices under £17 a ton, they are cheaper than hay at £8 a ton. The further reason why farmers should market as much of their hay as possible is that town horses are more dependent on hay than farm horses, inasmuch as substitutes can more readily be found in the latter case. It is estimated that if every consumer of hay could reduce by one-fifth the quantity fed to his stock last year, sufficient hay would be saved to supply the entire needs of the Army and town transport horses.

How to Secure Economical Use.—Hay is chiefly used for indoor feeding, so that the first measure for securing economy is to

reduce the indoor feeding period to the narrowest possible limits. Cattle should not be housed in the autumn until the condition of the pastures or other considerations make it obviously desirable. In this connection the outdoor wintering of store stock which is profitably practised in many districts should receive wider consideration.

It has been a matter of common observation in the past that on many farms much waste of hay has taken place owing to lack of care in the methods of feeding it to stock. In some cases the waste has been occasioned owing to the feeding arrangements permitting a good deal of hay to get under the feet of the animals and consequently become unfit for feeding.

This waste is reduced when the hay is fed from suitable racks. On the other hand the loss is greatly aggravated when, as not infrequently happens, especially in these days of shortage of labour, the amount of hay given at a foddering is more than the animals can readily consume. In such cases the wastage on the floor is greatly increased, and the surplus remaining at the next foddering is frequently so spoilt that it has to be thrown out for litter or manure. Such excessive foddering of hay is bad practice at any time, and is especially undesirable under present conditions. The amount given at one foddering should not be more than the animal will consume in an hour or so.

Still greater economy can be effected, though with enhanced labour, by feeding as much as possible of the hay in the form of chaff, preferably in admixture with a certain amount of concentrated food or pulped roots. In the case of cattle and sheep it is generally thought desirable that a fair proportion of the hay (or straw) should be given long to ensure satisfactory "cudding," but with reasonable care a considerable amount of chaff can be fed.

By far the most effective method of economising hay supplies is to use them mainly as a supplement to straw for all stock capable of consuming straw effectively. It is particularly desirable that this practice shall be extensively followed during the coming winter, since it secures the double advantage of economising our deficient supplies of hay and of utilising in the most effective way our relatively large supplies of straw.

The merits of the different kinds of straw for feeding are dealt with in detail in Food Production Leaflet No. 20. Generally speaking, wheat straw is the least nutritious, and can only be used for feeding to a very limited extent. Sound

oat and barley straw, on the other hand, are valuable fodder for cattle, sheep and horses, their nutritive value being commonly fully one-half that of good meadow hay or even higher for the feeding of store stock. The better qualities of oat straw and barley straw containing clover are also useful at certain seasons for sheep. In so far, therefore, as adequate consumption can be secured, hay may be replaced by fodder straw in the proportion of roughly two parts of straw for one part of hay. This replacement involves a reduction in the supply of albuminoids, but this is probably only of practical consequence, however, in the case of cows in milk. The addition of 1 or 2 lb. of concentrated food per stone (14 lb.) of straw used will remedy any deficiency in this respect. Where bean or pea straw of good quality is used as fodder in place of hay no such difficulty arises as it is richer in albuminoids than cereal straws. Oat straw should be reserved for feeding and should not be used for bedding purposes except where no substitute is available.

A little difficulty is often experienced in inducing stock to eat straw along with hay, especially if both be given in the long state. For this reason, and with a view also to reducing waste, it is probably best, as a general rule, to feed the hay in the form of chaff containing a proportion of straw. Chaff mixtures containing up to two-thirds of their weight of straw will be readily eaten. Full use should be made of cavings as well as straw.

Where the straw is not of the best quality, it may be desirable to subject it to preliminary treatment before use with a view to making it more palatable. Various methods which have been used for this purpose are dealt with in the leaflet referred to above.

In replacing hay by straw some regard should be paid to the demands placed upon the animals. Thus, in the case of horses, the proportion of straw used should be greater in periods of light work than at times when the work is heavy. In some districts it is, indeed, the practice to maintain horses with no other coarse fodder but straw. Similarly, in the case of milch cows, the replacement of hay by straw may be steadily increased as the flow of milk shrinks.

Finally, the possibility of overcoming the fodder shortage by an increased production of arable fodder crops for soiling or silage should not be overlooked (see Leaflet No. 9 and Food Production Leaflet No. 51). A modification of existing farming

the farmer independent of both the hay crop and the root crop and make his future farming operations far less dependent on the vagaries of the weather.

Copies of the leaflets referred to above and other leaflets bearing upon the subject of fodder supplies can be obtained free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W.1.

(This article is also issued as Food Production Leaflet No. 59. Copies may be obtained free of charge and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. Letters of application so addressed need not be stamped.)

FLOODS AND WATERLOGGED LAND: THE LAND DRAINAGE ACT, 1918.

1. **The Need for Arterial Drainage.**—There are estimated to be in England and Wales something like a million acres which, by the improvement of arterial drainage, might be either brought into arable cultivation or greatly increased in value as grass land. In view of the urgent need at present existing, and likely to continue to exist for some years at least, of utilising for the purpose of food production every available acre of land, this brief summary of the changes made and facilities afforded by the new Land Drainage Act has been prepared for the information of local authorities and of all persons interested in the land.

2. **Previous Difficulties in Dealing with the Matter.**—Private efforts, having in view the prevention of floods and the more efficient drainage of agricultural land, have often been attended with little success, as the endeavours of energetic owners and tenants have been neutralised by the failure of others to carry out work essential to proper drainage, and difficulties have arisen in securing combined action by the whole of those concerned. These difficulties have been especially apparent where the owners and occupiers of the land have amounted to any considerable number.

In many places Commissions of Sewers have been established for centuries; in others, drainage authorities have been constituted under local Acts; and a number of Drainage Boards

total area dealt with is, however, small compared with the large area of floodable and waterlogged land capable of improvement in the country. In many instances also the drainage districts have been formed with a view to isolated areas and without any provision for co-ordination between the drainage authorities exercising jurisdiction in the same river basin.

In the past, there have been two chief obstacles to the setting up of Drainage Boards. First, it was necessary, before the Board of Agriculture and Fisheries could set up a Drainage Board for any area, that a petition should be received by them from the owners of not less than one-tenth part of the acreage affected. Consequently, where the owners of any area requiring drainage were apathetic in the matter, neither the Board of Agriculture and Fisheries nor any other body could initiate proceedings. Again, in the event of a Provisional Order being drafted by the Board the assent of the owners of two-thirds of the area was required before any further step could be taken, and the trouble and expense involved in obtaining consent in cases where many owners were concerned often discouraged persons who would otherwise have initiated proceedings.

A further impediment to speedy procedure under the Act of 1861 was the requirement that any Order made by the Board setting up a Drainage Board, even in those cases where there was no opposition, should be inoperative until confirmed by Parliament.

3. **Difficulties Removed by the Act of 1918.**—The Land Drainage Act, 1918, is intended to facilitate the establishment of Drainage Boards, to render possible a revision of drainage areas so as to suit modern conditions, and to assist in various other ways the renewal and extension of arterial drainage.

4. **Establishment of Drainage Boards.**—Part I. of the new Act (Sections 1 and 2) considerably modifies procedure for these purposes. An Order constituting a separate drainage district may now be framed by the Board on receipt of a petition from the owners of one-tenth of the proposed area (as formerly), or from the council of any county or county borough in which any part of the land proposed to be affected by the Order is situate, or the Board may themselves initiate proceedings for such an Order. After due notice has been given, copies of the Draft Order deposited, objections considered, and, if necessary, a local inquiry held, the Board may proceed to settle the Order unless within a prescribed [illegible]ers of one third of the proposed district signify

Order cannot be made. The Order, when settled, becomes operative after 30 days' notice, unless within that period a memorial against it is presented to the Board, in which case (unless the memorial is withdrawn) the Order requires the confirmation of Parliament.

If the Order comes into force the expenses of obtaining it are, under Section 3, made a first charge on the rates of the district constituted by the Order. If the petitioners do not obtain the Order, they are required to pay the expenses.

5 **Alteration of Boundaries.**—The boundaries of an existing drainage area may be extended or altered (by a similar procedure) with the consent of the drainage authority for the area, and the petition may emanate from that authority.

The limits of a Commission of Sewers may be defined on the petition of the Commission.

6. **Powers to Transfer to County Councils.**—Provision is also made (Section 1 (2)), for the transfer, subject to certain conditions, on the petition of a county or county borough council, to such council of the powers, duties, property and obligations of drainage authorities exercising jurisdiction within the counties or county boroughs; such a transfer may also be made to a joint committee of county and county borough councils where the drainage area is within the jurisdiction of more than one council. The expenses incurred by a council as the drainage authority are to be defrayed under the transferred powers, and not out of the council's rates or funds.

The expression "drainage authority" is defined in Section 13 and includes Commissions of Sewers, Drainage Boards, and any body of persons authorised by a Local Act or Award to make or maintain works for the drainage of agricultural land.

7. **Increase of Rating Powers: Limit of Rates.**—In many instances a drainage authority is hampered in the execution of necessary works by a limit of rates which is inconsistent with modern conditions or by some other disabling or inadequate provision; to meet such cases the Act empowers the Board to confer upon a drainage authority additional powers of levying rates and borrowing, and of altering or supplementing the provisions of any local Act or award from which its powers are derived, where this is found necessary or expedient for the purpose of effective drainage (Section 1 (1)).

The petition for the Order may be presented by the drainage authority, or by the council of any county or county borough

8. **Other Provisions as to Rating.**—Section 4 removes any doubt as to the power of a Commission of Sewers, or a Drainage Board constituted under the Land Drainage Acts, to levy rates on the basis of acreage, and validates rates levied on that basis whether before or after the passing of the Act; but does not prohibit rating on the basis of annual value. The same Section enables an Order to provide for differential rating of a part of a drainage area or for total or partial exemption of buildings, railways, canals, inland navigation or any other special class of land.

9. **Contributions by Urban and Rural Authorities.**—Section 5 empowers local authorities, with the concurrence of the Local Government Board, to contribute to the expenses of drainage authorities where drainage works are desirable in the interests of the public health or for the protection or better enjoyment of highways.

10. **Combination of Drainage Authorities.**—Under Section 6, any drainage authority can make arrangements with the drainage authority of an adjoining area for the execution of works in the latter area on such terms of payment or otherwise as may be agreed.

11. **Navigations: Power to Transfer to Drainage Authorities.**—Section 7 provides under certain conditions for the entry of drainage authorities and navigation authorities into arrangements for the execution of necessary drainage works; and for the transfer to a drainage authority of the whole or any part of the undertaking of a navigation authority. This power may be of value in cases where the remains of obsolete navigation works form an obstacle to an effective drainage scheme.

12. **Outfalls Outside Drainage Areas.**—Section 8 enables drainage authorities to execute works outside their district under the same procedure as exists under the Land Drainage Act, 1847, and Part III. of the Land Drainage Act, 1861, for enabling persons interested in land to secure outfalls for their drains.

13. **Annual Returns.**—Section 9 requires every drainage authority to send to the Board of Agriculture and Fisheries annually, before a date which will be fixed by the Board, a report of their proceedings during the previous year. The form of report will be prescribed by Regulation.

14. **Power to Invest on Security of Rates.**—Section 12 authorises owners of land in a drainage area, who have power to invest money on real security, to invest money on a first mortgage of the drainage rates leviable in the area.

15. **New Powers Conferred upon the Board.**—Part II. of the new Act confers on the Board of Agriculture and Fisheries powers of considerable importance to secure the due performance of duties and obligations with regard to arterial drainage, and to arrange for the arterial drainage of small areas; these powers are summarised in the following paragraphs.

16. **Power to Enforce Carrying out of Duties and Liabilities.**—Under Section 15 of the Sewers Act, 1833, where a person or body liable to maintain works affecting drainage has failed to do so, an officer appointed by a Court of Sewers is empowered to execute any needful repairs and recover the expenses incurred from the person or body liable. This power may now be exercised under Section 15 (1) of the new Act by any officer appointed by and acting on behalf of the Board of Agriculture.

Section 15 (2) empowers the Board to exercise drainage powers conferred by any general or local Act or any Order or Award or by any Commission of Sewers, which are not being exercised or are being insufficiently exercised. This Sub-section enables the Board of Agriculture, if any drainage authority fails to maintain efficient drainage, to carry out the necessary work in place of the authority and to recoup their expenditure by the exercise of the authority's rating and borrowing powers It also enables the Board to enforce the drainage provisions of Inclosure Awards.

17. **Drainage Schemes for Small Areas.** — In Section 16 provision is made for dealing with the drainage of areas of land capable of improvement which cannot be conveniently dealt with under Part I. of the Act. Where the Board of Agriculture are of opinion that any such area is capable of improvement by drainage works, and that the expenses of executing and maintaining the works will not exceed the increase in the value of the land arising therefrom, they may prepare a draft scheme detailing the area to be improved, the proposed works, the estimated cost of their execution, the maximum amount recoverable by the Board in respect of such cases (not to exceed £5 per acre, or £5,000 in all), and the manner in which the expenses of executing and maintaining the works are to be apportioned amongst the lands in the area. The draft scheme is to be deposited for inspection, and notices given to the owners and occupiers of land in the area, and to other bodies

objections may be made and considered before the scheme i finally settled. For the purpose of executing and maintainin these works, the Board have, within the area concerned all the powers of a Drainage Board, and the expenses o execution (up to the maximum stated in the scheme) an of maintenance are recoverable by the Board in a summar manner, subject to the proviso that, if an owner so requires the sum payable by him may be payable by instalments i the same manner as in the case of a private improvemen rate for private improvement expenses incurred by a Loca Authority under the Public Health Act, 1875.

18. **Delegation of Powers.**—The Board of Agriculture hav power under Section 17 to delegate any of their powers unde Part II. of the Act to bodies constituted in accordance wit the terms of that Section

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FORMS IN WHICH PETITIONS UNDER THE LAND DRAINAGE ACT, 1918, MAY BE MADE.

BOARD OF AGRICULTURE AND FISHERIES.

Land Drainage Acts, 1861 and 1918.

Petition for the Constitution of a Separate Drainage District.

(Strike out paragraphs and words not applicable.)

County of ....

We, the undersigned, proprietors, within the *meaning of the Land Drainage Acts, 1861 and* 1918, of at least one-tenth part

or

We, the council of the administrative county of ...., or count borough of......................, in which are certain lands which form part

of an area containing acres or thereabout which is drained by such part of the (1).......
....
as lies between (2).......................
and ....
or by the tributaries or drains connected therewith, and is capable of being benefited by the maintenace or improvement of such river, tributaries or drains, hereby petition the Board of Agriculture and Fisheries to constitute a separate Drainage District under the provisions of the said Acts, comprising such lands as are capable of being benefited by the maintenace or improvement of such river, tributaries or drains.

(1) Name the main river or channel draining the area.

(2) Define the portions of the river or channel referred to by naming the points up and down stream at the ends of these portions.

The said lands are believed to be in no district of an existing drainage authority *or* Parts of the said lands are believed to be in the district of the following Drainage Authority :—..........
....

Signature and Address of Proprietor.*	Number of Acres in the Proposed District of which he is Proprietor.	Name and Address of Witness to Signature.

* For definition of "Proprietor" see Section 6 of the Land Drainage Act, 1861.

BOARD OF AGRICULTURE AND FISHERIES.

Land Drainage Acts, 1861 and 1918.

Petition for the Alteration of the Boundaries of a Drainage Area.

(Strike out paragraphs and words not applicable.)

County of...................................

For definition of "proprietor" *see* s. 6 of the Land Drainage Act, 1861.

We, the undersigned, proprietors within the meaning of the Land Drainage Acts, 1861 and 1918, of *at least one-tenth* of the lands described in the Schedule hereto

or

We, the council of the administrative county of...................................... or county borough of.............................. in which are situate the lands or some of the lands described in the Schedule hereto

or

We, the.............................. being the drainage authority of the drainage area known as the ....

being desirous that the lands described in the Schedule hereto should be included within (*or* excluded from) the drainage area known as ....and under the jurisdiction of the .... *hereby petition the Board of Agriculture and* Fisheries to make an Order under the said Acts for the alteration of the said drainage area accordingly.

Signature and Address of Proprietor.	Area of Scheduled Land Owned by the Proprietor.	Signature and Address of Witness.

SCHEDULE.

Lands proposed to be added (*or*, excluded).

The description may be by O.S. numbers or by a map attached.

NOTE.—*The Order cannot be made without the consent of the Drainage Authority.*

BOARD OF AGRICULTURE AND FISHERIES.

Land Drainage Acts, 1861 and 1918.

Petition for the Definition of the Limits of a Commission of Sewers.

We, the Commission of Sewers for.................................. .... acting under a Commission issued on the ....of......................18.... being desirous that the limits of the jurisdiction of the said Commission should be defined under the provisions of the Land Drainage Acts, 1861 and 1918, hereby petition the Board of Agriculture and Fisheries to make an Order under the said Acts defining the said limits.

BOARD OF AGRICULTURE AND FISHERIES.

Land Drainage Acts, 1861 and 1918.

Petition for the Alteration of a Local Act or Award.

(1) Give particulars of the Local Act and Award (if any) under which the Drainage Authority act.

We.. the drainage authority acting under (1)... ....

or

We, the council of the administrative county of .... or county borough of.......................in which is situate (part of) the drainage area under the jurisdiction of the drainage authority acting under (1)................................. ....

(2) Act $\frac{\text{and}}{\text{or}}$ Award.

being desirous that the provisions of the said (2)... should be altered or supplemented in the respects indicated in the Schedule hereto so as to enable the area for the benefit of which drainage works are authorised by the said (2)............... .... to be drained effectively, hereby petition the Board of Agriculture and Fisheries to make an order under the Land Drainage Acts 1861 and 1918 for altering or supplementing the provisions of the said (2)............................ ....accordingly.

SCHEDULE.

The Schedule should indicate the proposed alterations as fully as possible, but need not contain the precise terms of the amendments desired.

(*This article is also issued as Food Production Leaflet No. 56, copies of which may be obtained free and post free on application to the Secretary, Board of Agriculture and Fisheries,*

The Croydon Vacant Lands Cultivation Society.

IN this *Journal* for January, 1917 (p. 963), was published an article on the Croydon Vacant Lands Cultivation Society. The Society have recently issued their Third Annual Report for the year 1917–18, in which is given an account of the operations of the Society since its inception in September, 1914, and the following particulars are taken therefrom :—

A few days after the outbreak of the War, the unoccupied lands of the Croham Park Estate at Croydon were offered rent free by their owner, a well-known Croydon land owner, for cultivation by those willing to undertake the work. A committee was formed to make all necessary arrangements respecting this land, and it was decided to form a society for the purpose of carrying out the management. An undertaking was given to vacate possession if the owner should subsequently require the land, compensation in this case to be made to the occupiers for any loss of crops. More land was then secured, part of which was soon let.

During the next two years all vacant land in the county borough was sought out and registered; and where ownership could be traced the owners were urged to lend their land to the Society. A good deal of diffidence was experienced on the part of those who were in a position to give information, but help was afforded by official departments, and on the whole the response was gratifying.

All services were voluntary, an office was lent to the Society by the Guild of Help, a subscription of 4*s*. per plot was paid by the plot-holders, raised later to 5*s*., of which 4*s*. was carried to a compensation fund for the purpose of giving compensation to those plot-holders whose land was given back to owners without the plot-holders being able to obtain the full benefit of their crops and outlay on the land. By means of strict economy the total working expenses for the first two years (during which 995 plots were let out), amounted to only £35, and were met by voluntary donations.

In December, 1916, the Croydon Corporation were empowered by the Board of Agriculture under the new Defence of the Realm Regulations to undertake the cultivation of vacant land in the borough. The Committee of the Croydon Vacant Lands Cultivation Society agreed with the Allotment Committee of the Corporation to do all they possibly could to cultivate 61 acres, or 790 plots of vacant land upon which the

Corporation were entering. The land acquired was let at an annual subscription of 5s. for each 10-rod plot.

As a result of the national allotment movement, which was started early in 1917, there was an increased demand for allotments in the district. Applications for land were received at the rate of about twenty a day, and many persons volunteered their services, both in the work of letting the plots to applicants and in supervising subsequent operations. Later in the year, the Borough Council acquired further powers to enter occupied land, and about 65 acres or 850 plots, were let to the Society at various rentals up to £3 per acre, and all land thus rented by the Society was quickly taken up by allotment-holders.

Comparing the position of the Society at the end of the year 1917 with the position at the end of 1916, the area of land secured by voluntary agreement was about 176 acres (let in 2,377 plots) as against 68 acres (995 plots) at the end of 1916. This area includes the land at Wallington and Purley. Since then the Purley Branch has separated and formed itself into a separate society.

The policy of the Committee has been two-fold: (1) to use the funds of the Society for the cultivation of vacant and neglected land in order to increase the food supply of the district, and (2) to decentralise as far as possible, so that the plot-holders on the various estates might be persuaded to manage their affairs themselves. It is only recently that the latter plan has begun to bear fruit, and there are now no fewer than 6 registered societies and 8 unregistered which have been formed to look after the interests of different groups of plot-holders.

The success of the Committee was well exemplified in the excellent results which were obtained by plot-holders at the Croydon Flower Show, the prizes at which were generously provided by an anonymous donor.

Early in January, 1918, the Croydon Corporation gave notice of their intention to resume possession of the land already entered upon by them and to enter into possession of some of the land which has been let to the Society by the owners; and to make such land over to plot-holders' associations, recently formed and in contemplation. Accordingly, a list of the Society's lands entered by the Council, and handed over to the various small societies, consisting of about 1,700 plots, was submitted to the Committee. This still left some 630 plots on 70 different holdings under the management of the Committee. They agreed to cultivate this land to the

fullest possible extent and to acquire any additional land which might become available. Their efforts in this direction have from 1st January, 1918, up to the date of the Third Annual Report, resulted in the addition of 115 plots, covering about 20 acres, and there is still a large demand for such land.

The accounts of the General Fund for the year 1917, show the income of the Society to be £541 8*s*. 1*d*., in which is included £21 6*s*. 1*d*. as the balance in hand on 1st January, 1917, and £493 1*s*. 9*d*. in respect of subscriptions from the plot-holders. The expenditure amounted to £457 12*s*. 9*d*., the principal items being: rents of land, £167 1*s*, office, etc., £20; cost of labour, notice boards, fences stakes and drainage, £79 14*s*. 9*d*.; outlay on spraying less repayments, £21. Honorarium to the secretary, £105. The balance in hand at the end of the year 1917, was £84 5*s*. 1*d*.

In addition, the amounts to the credit of the compensation fund, including the Purley and Wallington branches, and, including £153 balance from 1916, amounted to £505, which was dealt with by payment of £56 to Purley on its becoming a separate society, and of about £200 to the new societies (about fourteen in number) in respect of the members taken over by them, and by retaining for the new compensation fund in respect of the plots remaining with the Society £136, the Wallington Branch £60, and 3*d*. per share for the general expenses fund of the Society.

Parasitic Mange in Horses: Practical Advice to Horse Owners.*

EVERYONE is familiar with cases in which certain individuals are only too willing to live at someone else's expense, and we all know how difficult such individuals are to get rid of and how desirable it is to get rid of them. Among all living creatures there exist certain classes generally small and insignificant to look at which have adopted this mode of living. These we call parasites, and their mode of living is called parasitism.

During the last two or three years certain parasites of this kind have adopted the horse as their unwilling host to such an extent that horses all over the country are affected with the diseases caused by their presence, and since it is impossible for a horse badly infected with these unwelcome guests to keep in good health, let alone perform its work efficiently, horse owners will recognise the importance of keeping horses free from parasites.

As the result of trials carried out by the Veterinary Department of the Board of Agriculture, a method of treatment has been evolved which will enable the horse owner to free and keep free his horses from these parasites, and all horse owners will follow with interest the extracts from a lecture given by Sir Stewart Stockman, Chief Veterinary Officer to the Board of Agriculture, on 1st August, 1918, showing how this can be done. The following are extracts from the lecture :—

External parasitism, of which the most serious is mange, is of great importance to horse owners and to the State at the present moment. During the last two years its prevalence has greatly increased.

Need for Co-operation among Horse Owners to Overcome the Disease.—*These diseases can only be successfully combated by the owners of the animals. If they will not co-operate in* curing and preventing mange and such diseases, no administrative order can have any material effect. It is their duty to the State at the present moment ; it is also their duty to the animals which suffer, and on personal grounds it is well worth owners' attention, since mange will seriously diminish the usefulness of their horses and greatly reduce their value. Mange may even cause considerable mortality in neglected cases.

Why the Disease Spreads.—The reasons for the increase are: Short rations, shortage of labour, and reluctance to report cases to the Authorities. None of these reasons, however, constitutes a good excuse for mange being allowed to spread. External parasitism need not spread under such conditions *if the parasites are destroyed, and good opportunities for* destroying them are provided when they are congregated on their hosts as at present.

Sympathetic Government Attitude.—The amending Mange Order which has recently been issued by the Board of Agriculture recognised the difficult position in which a horse owner may be placed if his horses are suffering from mange, and if he is *entirely* prevented from making use of them on account of mange. The Order allows affected horses, and those in contact to be worked under certain conditions which are exceedingly reasonable, namely, that they must be treated regularly in such a way as will effect their cure, and during the curative process render them harmless to other animals. There is no excuse, then, for neglecting to report cases of mange. Indeed, it is highly foolish on the part of an owner not to do so, since the Authorities are only anxious to be brought in contact with the outbreak in order to have the opportunity

of giving further instructions to owners as regards the best method of bringing the outbreak to an end. The shortage of labour for purposes of treatment can easily be got over by a mechanical method of applying treatment which will be demonstrated at the close of this address. It is not only an easy and labour-saving method, but it is exceedingly cheap, and should not cost more than 2*d.* or 3*d.* per application of dressing to the whole body. The treatment against one kind of parasite will destroy other kinds on the skin.

Something Important about the Unwelcome Guest.—Mange is a disease caused by external parasites known as acari, and since the parasites can pass from one animal to another directly or through the medium of stable tools, harness, litter, infected stalls, etc., it is contagious. There are two principal varieties of mange which are caused by different but related parasites. There is Sarcoptic Mange, caused by the Sarcoptes; and Psoroptic Mange, caused by the Psoroptes. The Psoroptes live on the surface of the skin, and, as a general rule, are easily got at by suitable remedies. On the other hand, the female Sarcoptes burrow beneath the superficial layers of the skin, and lay their eggs in dug-outs, as it were, where the young hatch. On this account the parasites are more difficult to get at, and this form of mange is somewhat harder to cure. It is quite curable, but requires more persistent treatment. To understand curative measures it is necessary to explain some points in the life history and habits of the parasites. The adult females lay eggs. *These eggs hatch out and produce larvæ in from four to six days;* that is an important point to remember in relation to treatment. Another important point is that the larvæ take from eight to ten days to become adults, at which stage they can lay a fresh crop of eggs. The parasites themselves can be destroyed more or less easily by dressings. The eggs are more difficult to destroy, though some dressings are better in this respect than others. This brings us to the subject of treatment and prevention.

Methods of Treatment and Prevention.—Details of treatment are described in a printed leaflet which I have prepared for issue by the Joint Committee of the Board of Agriculture and the Ministry of Food.* It is unnecessary, then, to go into details in this address, since it can be read in the leaflet. The dressings and appliances will be demonstrated at the close of this address, but full information regarding them can be obtained from the Public Control Department of the London County

Council and from the various War Agricultural Executive Committees. It may be said that, whereas all these dressings are to some extent irritating, it is essential that they should not be excessively so, as dressings which blister not only do the horse a lot of harm, but they make it resentful to wearing harness for work. In the case of Sarcoptic Mange it is to some extent advisable that the dressings should be just sufficiently irritant to make the surface layers of the skin peel off, as this expels the females and larvæ from their dug-outs, and exposes them to the action of the dressings. *It is a waste of time to try to treat mange by merely dressing the visible patches,* because there are bound to be others which have not yet become apparent. To be successful, treatment on each occasion must be applied scrupulously to every part of the body and limbs, particular attention being paid to the nooks and corners, such as under the limbs, under the tail, the base of the ears, the mane, and other hairy parts, and it is advisable that these hairy parts should be kept clipped. *It is also a waste of time to apply dressings, and to leave too long intervals between the applications of dressings.* The first dressing if properly applied will kill the surface parasites, but it cannot be depended upon to destroy all those in burrows or all the eggs. A second dressing is applied to destroy the larvæ hatched after the first dressing, and those which have emerged from the burrows. If this second application is too long delayed the larvæ may have become adults, and laid a fresh crop of eggs. It is essential, then, that the interval between the dressings should not be more than, say, seven days. Theoretically, two such dressings at the proper interval should be sufficient to cure a case of Psoroptic Mange, but it is advisable to give at least three. For the cure of Sarcoptic Mange the interval between the dressings might be somewhat shorter, say four days, and the treatment should be continued until the case is pronounced cured by the veterinary surgeon in attendance. Sometimes an odd diseased patch may present special difficulties as regards curing. It would be well in such cases to obtain a special dressing for such patches with the advice of a veterinary surgeon, but, in addition, the whole body and the legs must be dressed with the ordinary spray dressings.

Half Measures Useless.—It is useless to treat the animals, and neglect the harness, stalls, flooring, rugs, brushes, rubbers, cart shafts, litter, etc. Some parasites may lurk on these articles [illegible] the means of causing reinfection. These

horses for about three weeks, for the parasites cannot live for long periods off their hosts which provide the nourishment for subsistence. It is better and more convenient, however, to disinfect these articles by spraying them with, or dipping them in, the tar oil and tar acid dressing. They may also be treated by exposing them for several hours to concentrated formaldehyde gas or sulphurous acid gas in a closed room or large box. Soiled litter should be well removed from contact with horses, and it will disinfect itself.

A Plea for the Blacksmith.—It has been suggested that something should be said about the blacksmith in relation to the spread of mange. Some blame the smith, but to be quite just, the smith has also cause for complaint. If owners did not send him affected horses to shoe, or if they sent him only horses which had been subjected to the curative and preventive treatment advised, less would be heard about mange contracted at the forge. Nevertheless, it seems reasonable to advise smiths to wear an overall when shoeing a suspected horse, and to disinfect his overall and apron afterwards as in the case of harness. He should also spray the smithy head-stalls and the flooring.

Suspect the Itchy Horse and Seek Advice.—Someone to my right suggested that a description of the symptoms of mange might be given. It is impossible in one lecture to cover every point of the subject, and I wish to get on with the principal part, viz., the demonstration. Further, to protect himself and obtain the full benefits from the amended Order, the owner should obtain veterinary advice regarding the form of mange which exists. A full description of the symptoms will be found in Leaflet No. 274, which can be had from the Publications Branch, Board of Agriculture, 3, St. James's Square, London, S.W. 1, or from Local Authorities for the asking.* My advice is, however, that you should regard every itchy horse as suspicious and have it treated, and at the same time treat the contacts as a precautionary measure. One of the objects of this meeting is to advise horse owners at the present time to treat their horses for the prevention and cure of external parasitism as farmers treat their sheep, and to do it of their own accord.

(This article is also issued as Leaflet No. 8B, *of the Joint Committee of the Board of Agriculture and Fisheries and the Ministry of Food. Copies may be obtained, free of charge, on application to the Secretary, Joint Committee,* 6A, *Dean's Yard, Westminster, S.W.* 1. *Envelopes so addressed need not be stamped.)*

* A cinema film showing the method of applying the treatment has been

Dressing for Mange in Horses, Suggested by the Veterinary Department of the Board of Agriculture and Fisheries.

Ingredients.—Lime, powdered sulphur and water in the proportions indicated below. A convenient quantity for a large establishment to make up at a time would be 9 lb. lime and 18 lb. sulphur.

Method of Preparation.—Slake the lime and make into a thick paste with the sulphur. Place the mixture in a strong cloth, tie the ends and suspend in a boiler containing 10 gal. of water so that the water completely covers the contents of the cloth. The cloth must not touch the sides or bottom of the boiler, as otherwise the cloth may be burnt and its contents escape. Boil for two hours, then remove the cloth, taking care that none of its contents escape into the water, and throw the solids away. Make up to 10 gal. again with additional water and put the liquid into a tight drum or barrel.

Application.—*For Preventive.—Application.*—Dilute the fluid with ten times the amount of water, *i.e.*, 1½ pt. of the fluid to every 2 gal. of water, and apply with a spray to all parts of the horses' body.

For Affected Horses.—Dilute the fluid with eight times the amount of water, that is, 2 pt. of the fluid to every 2 gal. of water, and apply with a spray to all parts of the horse's body.

Quantity Used.—Two gal. of the diluted fluid is sufficient to treat one large horse.

Particulars as to other remedial dressings for Parasitic Mange may be had on application to the Local War Executive Committees, whom the Chief Veterinary Officer of the Board has undertaken to notify of preparations found especially useful.*

The best method is to give a first dressing with a tar oil and tar acid dip such as the above Committees recommend, and to continue with the lime and sulphur dressing.*

It is essential that every part of the body and legs be well drenched with the spray.

(This Note is also issued as Leaflet No. 8A of the Joint Committee of the Board of Agriculture and the Ministry of Food. Copies may be obtained free on application to the Secretary, Joint Committee, 6A, Dean's Yard, Westminster, S.W. 1. Envelopes so addressed need not be stamped.)

* Information as to suitable spraying pumps can be obtained from the same source.

Contents of the "Crop" of a Wood Pigeon.

With reference to the Note on "The 'Crop' of a Wood Pigeon," which was published in the issue of this *Journal* for August last (p. 584), the Board have received from Mr. S. P. Mercer of Armstrong College, Newcastle-on-Tyne, some interesting particulars of the contents of the crop of a wood pigeon shot in Cumberland in April, 1917. The crop contained about 8,000 seeds (weighing 14 grammes, after being washed and dried) of Spreading Orache (*Atriplex patula*), which were all ingested at one meal. It would seem, therefore, that the bird may sometimes be of some agricultural use. It may be stated that there were, in addition, about a dozen seeds of two species of vetch and a few very small scraps of clover leaf, but not enough of the latter to make one whole leaf.

Notes on Manures for December, 1918: *From the Rothamsted Experimental Station, Harpenden, Herts.*

The Importance of Dung Heaps and Composts.—The shortage of feeding stuffs is reacting on the manure heap, and the farmer's chief fertiliser will not be as rich as usual. This unfortunate state of affairs can be mitigated in two ways: (1) by taking the greatest possible care of farmyard manure, including liquid manure, and (2) by enriching the manure heap with any scraps and waste substances likely to be of sufficient manurial value. Farmers and others near large towns and villages who are able to obtain slaughterhouse residues, wastes from hide markets (such as salt, blood, and other fragments), sweepings of yards of salted hides of horses and cows, wastes from vegetable markets, or other similar materials, may make them into a compost, thereby increasing the bulk of manure available for application.

The need for improving the method of making and storing farmyard manure has been so often emphasised in these columns that it is unnecessary to do more than recapitulate the main items. First and foremost, the manure must not be exposed to the washing action of rain: the amount of damage suffered from this cause over the country is still very considerable. If the manure must be made in an open yard there should be an abundance of litter; broken and damaged straw, or straw released from potato clamps that have been opened, can be thrown in to prevent the manure from becoming too wet. When the manure is drawn out from the yard to be clamped, it should be put into as sheltered a position as possible, and, if at all feasible, covered with a layer of earth. Farmers

fortunate enough to possess liquid manure tanks should put these in order, and see that the drains are clear and unbroken. The liquid can be applied to grass land all through the winter and early spring: it makes an admirable dressing for temporary grass mixtures, and can be put on to stubbles intended to be followed by roots.

Compost Making.—In many parts of the country compost making is now a lost art, but at one time it flourished vigorously. Some of the farmers of 50 years ago were great adepts in the art. In certain districts composts are still made, and the practice might well become more general, especially in the case of small farms and market gardens. Perhaps the type of composts that has persisted longest is the old "lime compost," made by alternating layers of vegetable or animal refuse with lime. From the old directions given by one of the chief experts of his day, it appears that the best results were obtained when lime was composted with materials poor in nitrogen, such as hedge clippings, leaves, old banks of earth, scourings of ditches, road sweepings, weeds gathered from fallows or stubbles, peat, sawdust, roots of couch grass, etc. These were well mixed in the proportion of about one of lime to three of the other materials: the heap was left for a time, and then turned. The dressing was about 24 tons per acre, but sometimes more was used: modern conditions would demand less. Good results are said to have been obtained with cereals and on grass: indeed, many farmers still use some lime compost on their grass land.

Earth composts were preferred where the material contained more nitrogen than the above-mentioned substances, such, for example, as animal refuse, slaughterhouse waste, etc. The proportion of earth varied; as much as 10 cartloads of earth to one of animal waste was sometimes used: in other cases only half this quantity of earth It was, however, claimed that better results were obtained from the use of earth than from lime or farmyard manure: in these days of scarce labour, unfortunately, only horticulturists could make an earth compost, and usually it would be necessary to make a dung compost instead. In this case no earth is used, and the materials are simply thrown into the mauure heap: obviously they should be richer in nitrogen than the ordinary vegetable refuse.

Bonfire Ashes as a Source of Potash.—The supplies of potash are still insufficient for all agricultural requirements, and whenever possible it is desirable to utilise ashes from bonfires. Docks, couch or [illegible]ch, hedge trimmings, fragments of straw, seeds,

[illegible] which cannot safely be thrown

into the yards or conveniently put on grass land, may be burnt, when they yield an ash nearly equal in value to kainit. To the allotment holder this source of potash is more valuable than to the farmer, because he usually has a larger amount of material to deal with in proportion to his smaller area of land: with care, he ought to have little difficulty in satisfying his potash requirements. Allotment holders' societies might well look into this matter and explore the possibilities in their own localities.

Improve Clover Leys if Possible.—Clover is playing an increasingly important part in the economy of the farm, both as a concentrated feeding stuff and as a fertiliser. Nothing should be left undone to secure a good crop. The two common causes of failure are wetness of the land and lack of lime. For wetness there is unfortunately only one remedy, viz., drainage, which, in present circumstances, is very difficult to apply. Lack of lime, however, is more easily put right, and no effort should be spared to do this. In some cases there is reason to believe that the nitrogenous manure applied to the corn crop in which clover was growing caused injury to the clover by stimulating the growth of the corn: this is unfortunate, but it cannot be helped. More commonly, especially in the Eastern Counties, the trouble has arisen because Red Clover is grown, and this variety, under conditions locally obtaining, is liable to clover sickness if sown too frequently on the same ground. Prevention here is better than cure: the trouble can be avoided by lengthening the time between successive crops, *e.g.*, substituting Trefoil for the Red Clover, or a mixture of Alsike Clover and Trefoil. A certain amount of Red Clover can, if desired, be added to this mixture. Considerable attention to the clover leys will be needed both this year and next.

Nitrogenous Dressings for Winter-sown Corn.—The persistent rainfall of October has gone some way towards washing out nitrates from the soil, so that winter-sown corn will stand in need of help, and the need will become more prominent if the rain continues. A good dressing of household soot would be the best remedy, but, failing this, sulphate of ammonia is an effective substitute. In any case it is necessary to make provision early.

Army Stable Manure.—Farmers in Surrey, Sussex, and Hampshire who are near enough to Aldershot can obtain manure from the Eelmoor Dump at 5*s*. per ton. Analyses of Army stable manure show that it is very satisfactory in composition, and at this price must be considered good value for money.

Lime and Limestone.—Arrangements are now in working order for the distribution of lime in the South-Western Counties of England at a cost of 23s. per ton, which is cheap, considering the value of the return that may reasonably be expected on land deficient in lime. Particulars can be obtained from the Food Production Department of the Board.

Planting of Fruit Trees.

THE following is a list of those varieties of fruit trees that have proved themselves generally to be the most serviceable for allotments and small gardens, the surplus from which finds ready sale if marketed. It should be understood that fruit-tree planting only pays on permanent allotments; war-time allotments are only supposed to carry seasonal crops.

It would be difficult, if not impossible, to name the "best variety" for every district, as the climatic conditions and soil vary so greatly in different places. The list here given, however, will be found to apply generally, and should form a useful guide. It is based on the idea that the surplus from any of the varieties noted would find a ready sale on the market if properly graded, and forthcoming in quantity, as well as supply the grower with desirable sorts for his domestic use.

APPLES.

Early Dessert Varieties: Fit to market when gathered.

Name of Variety.	*Season.*
Gladstone	July to August.
Beauty of Bath	,, ,,
James Grieve	September to October
Worcester Pearmain	,, ,,

Mid-season Dessert Varieties: Better kept for a time before marketing

Allington Pippin	November to February.
King of the Pippins	October to January.
Charles Ross	November to December
Cox's Orange Pippin	December to February.
Blenheim Orange	,, ,,
Ribston Pippin	December to March.
Rival	,, ,,

Early Cooking Varieties: Gathered and sold at once.

Early Victoria	August to September.
Grenadier	September to October.
Stirling Castle	October to November.

Mid-season Cooking Varieties: Stored for a time.

Rev. W. Wilks	October and November.
Warner's King	September and October.
Bismarck	October to December.

Late Cooking Varieties: All good keeping sorts.

Lane's Prince Albert	November to February.
Newton Wonder	November to March.
Wellington	,, ,,
Bramley's Seedling	December to April.

PEARS.

Early Pears: Best sold when gathered.

Fertility	August and September.
Williams' Bon Chretien	September.
Conference	October.

Second Early Varieties: Will keep a few weeks after gathering.

Brown Beurre	November.
Brockworth Park	,,
Pitmaston Duchess	,,

Late Pears: Will keep some time after they are gathered.

Doyenne du Comice	November and December.
Glou Morceau	,, ,,
Thompson	,, ,,
Catillac	January to March (Stewing)

PLUMS.

It is assumed that these plums would be grown on standards in the open, as allotment holders very rarely have the facility of a wall.

The Czar	Early August.
Pershore	End August.
Victoria	September.
Pond's Seedling	Mid-September.
Monarch	End September.

DAMSONS.

For growing as standards :—

Farleigh Prolific Damson	September and October.
Merryweather Damson	,, ,,
Shropshire Prune	September to November.
Langley Bullace	November.
Buckinghamshire Prune	,,

The following are a similar list of the soft fruits :—

Raspberries : Superlative ; Norwich Wonder.

Black Currants : Boskoop Giant ; Lees Prolific ; Seabrook's Black.

Red Currants : Red Dutch.

Gooseberries : (Red Varieties) Lancashire Lad ; Winham's Industry ; Crown Bob ; Warrington ; Rifleman. (Green Variety) Keepsake. (White variety) White Lion. (Yellow variety) Leveller.

Strawberries : Givon's Late Prolific ; Laxton's Cropper ; Royal Sovereign.

Loganberry : This can be planted in any odd corner and proves very useful when trained over an unsightly fence, shed, or

Agricultural Legislation in the United States.

AN Agricultural Act providing for the national security and defence by stimulating agriculture and facilitating the distribution of agricultural products was approved by Congress on 10th August, 1917 (See this *Journal*, November, 1917, p. 880). By the Act certain sums of money were appropriated for agricultural purposes until June, 1918.

A House Resolution, numbered H.R.11,954, was passed by the House of Representatives on 7th September, 1918, giving further support to this Act. It authorises further expenditure for certain agricultural purposes, and, *inter alia*, prohibits the manufacture from articles of food of spirits, wines, and other intoxicating drinks; prohibits the exportation and the transport among the several States, of certain specified feeding stuffs without a permit; and establishes a Rent Administration for the control of real estate in the District of Columbia.

The following are the principal grants appropriated for agricultural purposes by the House Resolution:—

For the prevention, control and eradication of the diseases and pests of live stock; the enlargement of live-stock production; and the conservation and utilisation of meat, poultry, dairy and other animal products, $901,025 (£187,700).

For procuring, storing, and furnishing seed wheat and beans (this sum has already been authorised outside this Resolution) $6,500,000 (£1,354,200).

For increasing food production, eliminating waste and promoting conservation of food, including edible nuts, by educational and demonstrational methods through country, district and urban agents and others, $6,100,000 (£1,270,800.)

For gathering authoritative information in connection with the demand for, and the production, supply, distribution, and utilisation of food, and otherwise carrying out the purposes of Section 2 of the Act; extending and enlarging the market news service; and preventing waste of food in storage, in transit, or held for sale; advice concerning the market movement or distribution of perishable products; for enabling the Secretary of Agriculture to inspect and certify perishable agricultural products, $1,280,155 (£266,700.)

For miscellaneous items, including the salaries of assistant secretaries appointed under the Act approved 10th August, 1917; special work in crop estimating; aiding agencies in the various States in supplying farm labour; enlarging the

and

printing and distributing emergency leaflets, posters, and other publications requiring quick issue or large editions, $1,105,980 (£230,400.)

Broadcast Wheat Sowing.

THE following note is based on information supplied by farmers, agricultural organisers and officers of the Board in response to an inquiry addressed to them by the Food Production Department.

The modern and most approved method of sowing wheat, namely, by drilling, is not adapted for wet weather, consequently the efforts of farmers to get on with this work may be seriously hampered, as in the present season, by spells of rain. The effects of bad weather are felt most on the heavier classes of soil which, once thoroughly soaked in late autumn, are apt to remain wet and unworkable for many weeks.

In view of the national importance of getting in as much winter corn as possible farmers should, as an emergency measure, consider the question of sowing seed broadcast. About 1 bush. per acre more seed will be required than that normally allowed for drilling, but this should be counterbalanced by the advantage of earlier sowing, the saving of labour, and the larger area that can be tackled.

Broadcasting on the Furrow.—This is a general and successful practice on many of the heavier wheat lands. A well set-up furrow, properly harrowed after sowing, provides ample covering for the seed and, at the same time, enables water to get away more freely than the finer and deeper tilth usually prepared for drilling.

The practice is also adapted to old grass land where the turf would interfere with drilling. In this case it is advisable to " press " before sowing, so as to eliminate hollowness and secure a seed-bed of uniform depth and firmness.

Broadcasting and Ploughing in.—This practice is occasionally followed on free-working soils after potatoes, mangolds or turnips which have been cleared late in the season. In such cases the surface soil is already fairly friable and the usual preliminary ploughing and harrowing may thus be dispensed with. The seed is sown on the surface and immediately ploughed in to a depth of 2 to 3 in., and the land need not, as a rule, be harrowed afterwards. This method provides a seed-bed of the requisite firmness below, while at the same time it is left in a mellow, yet not too fine, condition above. The practice is not suited to heavy land as there is a danger of the plant not coming through.

If double-furrow ploughs are available the whole operation is quickly completed.

As a precaution against loss from bird attacks no more should be sown than can be covered in at one yoking; when once ploughed in, however, the seed is generally safer from birds than when drilled or harrowed in.

Cultivation of School Gardens in Hertfordshire.

THE following particulars of work done during the past year at elementary schools in Hertfordshire in connection with food production speak highly of the efforts of the children in helping in the present national emergency:—

One hundred and forty-one schools took part in the work, including 53 which have ordinary school gardens. The total area cultivated was 45 acres, of which 17 were in ordinary school gardens. The number of children engaged in the work was, approximately, 3,600 boys and 800 girls. The value of the produce distributed to the children in kind was £571, and of that which was sold, £355 14s., total £926 14s., but these figures do not include about 20 schools from whom the return as to produce has not been received. There are about 90 schools for older children which did not take part in the work, and most of these are proposing to do so during the present season.

Rationing of Live Stock: Allowance and Distribution of Concentrated Foods.*

THE new scheme of rationing for live stock comes into operation on 17th November, and particulars were given in our last issue* of the interim arrangements for distribution. It is with very great reluctance that the Food Controller has decided to institute a strict rationing of animals in so far as concentrated feeding stuffs are concerned.

The actual quantities permitted under the new scheme are as follows:—

Classes of Live Stock.	Per Day.		For Ten Weeks' Period.	
	Cake or Meal.	Offals or Grains.	Cake or Meal.	Offals or Grains.
	lb.	lb.	cwt.	cwt.
Cows in milk, kept under rural conditions	2·4	2·4	1½	1½
Cows in milk, stall-fed under urban conditions	3·2	4·8	2	3
Calves under six months old ..	·4	·4	¼	¼
Bulls over six months old, kept for breeding	2·4	—	1½	—
Horses, agricultural	—	·4	—	¼
Horses, not agricultural, entitled to rations under the Horses Rationing Order†	—	2·0	—	1¼
Sows in farrow, and boars	—	3·2	—	2
Store Pigs	—	1·0	—	⅝

This means that for sheep and cattle other than dairy herds and breeding stock there are no supplies of imported food, and owners are compelled, therefore, to rely upon crops grown on the farm.

Rationing is not quite so serious as might appear at first sight, since oats, roots, beans, peas, hay, and straw are left free of the ration. A reduction, however, in the quantity of the feeding stuff to be supplied will be made by the Area Live Stock Commissioner on account of any quantities of damaged or tail corn for which the applicant has obtained a licence to feed to his stock.

The position which has led to the rationing of stock is due to the necessity of cutting down the British programme of total food requirements in view of the shortage of tonnage. In order to bring the maximum quantity of men and munitions to Europe it is necessary radically to limit the import of feeding stuffs and food. There are not enough ships for both. The demands of the American Army in Europe have very severely limited the space which could be devoted to ordinary cargoes.

When it came to making a choice between human and animal food, it was inevitable that the preference should be given to human food. Again, when a choice had to be made between the different classes of live stock, priority of supply was given to the dairy herds, because of the incontestable importance of maintaining the milk supply and breeding stock, so that the industry should not suffer permanent damage. Small supplies are available for pigs up to the end of the year, but after that point it is impossible to guarantee concentrated food, though there may be a limited quantity. This is not quite so serious at this period of the year as it would be at any other time, since a large proportion of the pig population is ordinarily slaughtered at Christmas. The warning now given will deter the purchase, especially by cottage owners, of stores for spring fattening.

Some farmers are much better supplied than others with home-grown foodstuffs—with oats, roots, beans, peas, etc.—and, if those who have sufficient stocks in hand are able to do without the concentrated foods, it may be possible to provide a small margin for other stock. Generally speaking, it is probable that the strain on shipping must continue for the present, and it is not likely that an increase in imported feeding stuffs will be possible; consequently, any gains must be made by economising in stocks.

The Ministry of Food recognise the difficulty under which farmers are placed, and the decision to institute a definite rationing of live stock on the basis just described was only reached after consultation with the agricultural authorities. A change is made in the system of distribution which places responsibility largely in the hands of the Area Live Stock Commissioners, who are in close and constant touch with the farmers' committees in their area; and the new arrangements will, it is hoped, provide a perfectly just basis for the distribution of such supplies of feeding-stuffs as it has been possible to import.

There are complaints with regard to the quality of some of the mixtures sold for the feeding of animals. It has been very difficult to control these on account of their very various compositions. Steps are now being taken by the Feeding Stuffs Section of the Ministry to standardise meals and to fix prices accordingly.

Feeding Stuffs Committee.—The constitution of the county com-

been decided to make certain modifications. The committees will in future consist of—

- Four farmers, nominated by the War Agricultural Committee;
- Three dealers, nominated as far as possible by local associations;
- One representative of the co-operative societies, nominated by the Agricultural Organisation Society;
- One miller, nominated by the local millers' association; and
- One brewer.

The function of these committees will be to advise the Area Live Stock Commissioner on questions connected with licensing and registration, with control and sale, and in the distribution of feeding stuffs.

Area committees, mainly nominated by the county committees and similar in composition, are also being set up. The main duties of an area committee are to regulate the distribution of local produce, either by letting the producers act themselves as direct suppliers or by passing on to them buying permits for local supplies that have been given by the Area Live Stock Commissioner to local suppliers. Among other duties, this committee will have to advise on the withdrawal of dealers' licences.

It has been suggested that dealers and agents have in some cases given to farmers application forms with their own names filled in as suppliers, thereby suggesting that farmers are not at liberty to select any supplier they choose. Applicants may, if they desire strike out any names of suppliers inserted on application forms, and insert the names of other suppliers entitled to trade in their district. (*National Food Journal*, 23rd October, 1918.)

THE following questions were put, and the following answers given, in the House of Commons on 16th and 17th October:—

The Glut of Fat Cattle: Questions in Parliament.

Sir John Spear: Is the Minister for Food aware that in Devon and Cornwall many thousands of fat cattle are ripe for slaughter, but cannot be disposed of by farmers because of the small demand now being made for such cattle for grading? And is he aware that many of these beasts are declining in condition, and yet consuming food intended for the purpose of preparing lower-grade animals for slaughter in ensuing months? In order to relieve the congestion, could he not arrange for the slaughter of a large number of these cattle and place the meat in cold storage for winter use, when meat will be very scarce? And will he put in force a more expeditious method of liberating damaged corn in order to enable farmers to complete the fattening of more stock for winter killing? (Wednesday, 16th October.)

Major Astor: I am aware that the supply of fat cattle is in excess of the requirements under the present scale of rationing, and that grass-fed cattle are bound to decline in condition unless arrangements can be made for yarding them. The Food Controller cannot increase the existing ration now without an equivalent reduction after Christmas, as there is no present proposal of any further imported supplies. It is, therefore, essential for our supply of meat early next year to encourage the farmer to keep his beasts until after Christmas; but it is fully

makes his task difficult. The question has been discussed with the Central Agricultural Advisory Council, who have made suggestions to the Food Controller for the purpose of relieving the situation, and these are being sympathetically considered. Meantime, all possible means of utilising fresh meat are being adopted; arrangements have been made for supplying the Home Forces, both naval and military, as far as possible with home-killed meat, and an endeavour is being made to export some quantities to France. The frozen meat thus saved will be stored for subsequent use. There is no plant available for freezing any considerable quantity of fresh meat, but steps are being taken to provide cold storage which will enable such meat to be kept in a chilled condition for a certain time. In view of the fact that it is impossible to import sufficient frozen meat to provide the necessary meat ration for the first four months of the year out of frozen meat only, the Food Controller hopes that farmers will do their utmost to hold over their cattle as long as possible. The arrangements made for administering the Cereals (Restriction) Order* are working satisfactorily. From 1st September to 9th October, 23,423 qr. of damaged grain were released for feeding purposes. Nearly 5,000 applications have been dealt with, and approximately nine-tenths of these were successful. An Order is being drafted to register grist millers to fix a maximum charge for the mechanical treatment of cereals and pulse and to fix maximum prices at the cost of ingredient plus the permitted charge for such treatment. The Order will prohibit the addition of husk and worthless material and the gristing of composite meals consisting of cereals and pulse, and will provide for weekly or fortnightly reports from all grist millers of the composition of the meals and the cost of the ingredients into the mill, and of the price charged *ex* mill.

Captain Sir B. Stanier: May I ask if the hon. and gallant gentleman is aware that not only in Devonshire and Cornwall, but in practically every county in England, this same sending back of the animals for market is going on, and cannot he go further and deeper into the question of chilling?

Sir J. Spear: May I ask if he realises that the holding back of this cattle at present will reduce the supply for winter use?

Major Astor: The Food Controller is quite aware of the difficulties which farmers are experiencing. The matter has had the attention of the Department for some time, and he hopes to make an announcement shortly. At the moment, generally speaking, only first-grade animals are being slaughtered.

Colonel Weigall: Are we to understand that the whole question of the feeding stuffs and home-produced cereal feeding stuffs is to be reconsidered; and, if so, will the advice of the Central Advisory Council be taken, in view of the fact that the present programme was agreed on without consulting the Advisory Council?

Major Astor: As I said just now, the suggestions of the Central Advisory Councils are being sympathetically considered by the Food Controller. I am afraid there is no prospect of revising their whole feeding-stuffs programme, because that depends on the military programme.

Colonel Weigall: Then how is their advice being considered?

Major Astor: They have made various suggestions for dealing with the present excessive number of cattle coming on to the market, and those suggestions are being considered.

Sir F. Flannery: Will the hon. and gallant gentleman say whether his Department is aware that in every market throughout East Anglia there is this going back of beasts for which there is no sale, and will he also say whether his Department and the Board of Agriculture are exactly in unison and acting together in this matter?

Major Astor: The Food Controller has been in constant touch with the three Boards of Agriculture, as well as the Central Advisory Council.

Colonel Yates: Will the hon. and gallant member say who is responsible for the Orders that resulted in this glut of beasts?

Major Astor: The glut is not due to any Order. It is due to the military programme, and the need for bringing over an increased number of American troops. That has meant a cutting down in the quantity of imported feeding stuffs, and the Food Controller is confident that as soon as this is appreciated by farmers they will do all in their power to assist.

Mr. Denman: Will farmers be allowed to use their own damaged corn?

Major Astor: There is no restriction except as regards price upon the sale of damaged grain, except when sold by retail—that is to say, quantities of 10 cwt. or less.

[NOTE.—It is clear from the terms of the Cereals (Restriction) Order,* which was quoted in the main reply, that "damaged grain" here refers to such tailings of corn and damaged wheat, rye, barley or dredge corn as have been certified by the local Grain Officer to be unfit for the manufacture of human food, and for which the farmer has been granted a licence entitling him to feed them to livestock.]†

On the Motion for Adjournment, Sir John Spear said: The question of the slaughter of fat cattle is so important that it was not possible to deal with it by question and answer across the floor of the House. I cannot produce exact figures as to the extent of the difficulties that have arisen, but I think I am within the mark when I say that for every fat beast accepted by the butchers, two, if not three, are rejected through lack of opportunity to dispose of them. The farmer has been urged by the Prime Minister and others to do everything possible to produce meat, and we have been asked more than once this year to keep back the beasts and make them heavier in order to increase the food supply, and now there is not by any means sufficient outlet for these cattle. In addition to these difficulties, the Government is commandeering a great part of the hay. My hon. and gallant friend spoke of the lack of provision for cold storage. I think the Government is very seriously to blame for the neglect to make provision of this character. While we realise the difficulty, which is approaching disaster to the farmer, after all it is a matter for congratulation that after four years and more of war we are dealing with the difficulty of home supply instead of lack of food for the people. It cannot go beyond a month, or at the most six weeks because there are certain farmers the character of whose land

would urge again on my hon. friend (Major Astor), who has shown appreciation of the case, the necessity of the immediate liberation of damaged grain, and of allowing farmers to use for their cattle all the dredge corn which they have grown. I think it is absolutely necessary for milk production that all the cake should be freed for use. I would also suggest that there should be an increased price for meat during the winter of at least 5*s.* per live cwt., to encourage farmers to keep on their cattle and to remunerate them for the extra outlay I claim that the great influx of cattle from Ireland should be checked.

The debate was continued by Sir Croydon Marks and Major Lane-Fox.

Major Astor : In the very few moments that are available, I wish to put as many facts as I can before hon. Members, and I welcome this opportnnity of doing so, even in a restricted manner. First of all, I quite realise—and we all realise—the extraordinary difficulty farmers are placed in at the present time. We fully appreciate that. But we are quite confident when they realise the facts and difficulties that we shall be able to count upon their co-operations.

Sir F. Flannery : More sacrifices !

An Hon. Member : Why do not you buy refrigerating plants ?

Major Astor : First of all, the situation which has arisen is entirely owing to the military programme decided upon by the Allied Governments ; and, secondly, my right hon. friend has acted in consultation with the President of the Board of Agriculture and the Agricultural Department. They have agreed, and we have all agreed, as to the programme. The Food Controller, no more than the President of the Board of Agriculture, wants to cut down feeding stuffs—it is obviously not to our interest to do so : we are interested in the maintenance of the production of food—but the figures which have been agreed to have been approved of and settled by the Cabinet with due regard to the military programme.

Mr. Leif Jones : May we know what tonnage they have allowed ?

Major Astor : I cannot give the figures. As regards the present situation, it is due to a certain extent to the fact that in last August and September we had considerable difficulty in providing meat, as growing cattle were not coming forward as well as we expected. They were kept longer on the farms owing to there being a great deal of grass during those months. I can assure hon. Members that the various proposals which have been put forward will receive sympathetic consideration. Some of them are always being considered, and others will be carefully attended to by my right hon. friend. May I mention some of the steps which are being taken to relieve the situation ? First of all, we are trying to get as much fresh meat consumed as possible, while at the same time reducing the amount of frozen meat which is being consumed. The Army has been taking fresh meat four days a week. Arrangements have now been completed with the War Office whereby the military forces in England will take fresh home-killed meat for six days per week. The Navy are taking as much fresh meat as they can, but it is quite obvious that they have to depend to a great extent on frozen meat, since they have to go to sea. As regards storage accommodation and refrigerating accommodation, hon. Members are quite wrong in saying

"Refrigerating!") We have got ample refrigerating accommodation for storage purposes, but the difficulty is that the plant is not available for freezing. It is practically impossible to use the present plant for freezing. We provided the necessary storage accommodation to meet the situation required by the military programme. There is a shortage of freezing plant in the United States at this moment, and, in addition to that, although we are freezing a certain amount, we find a considerable lack of skilled men. We hope to deal with 2,000 tons by chilling them, and as far as freezing goes, at present, I think we are freezing 4,000 to 5,000 beasts per week, and we hope to work up to a maximum of 8,000. That is all we can hope to do, but it will be of considerable assistance. I only wish we could do more. It has been suggested that we ought to increase the meat ration now, and thus relieve the situation. I am sure the House will agree with me that it is essential to be able to guarantee a fair meat ration from January to April. Whatever we do, there is a strong possibility that the meat ration may be reduced, that it may come down. We cannot look to any increase of frozen meat from the U.S.A. We cannot allow for any increase of importation on our present expectations. As regards damaged grain, as I told my hon. friend at question time, nine-tenths of the applications for licences have been granted already, and our reports are that the machinery is working well. We are going to have an Order shortly dealing with composite meals, which, I believe, will be of considerable assistance to the farmer and do away with some of the genuine grievances which have existed in the past. I am sure there is no farmer who is not willing to submit to any inconveniences and difficulties—and he will have to face inconveniences and difficulties during the winter—if by doing so he can do anything to shorten the War even by a few weeks. What is happening in France shows, I think, the Government are justified in concentrating their efforts on bringing the War to an early termination, and I am perfectly certain that when the facts are known—and I have tried to put them briefly before the House—we shall be able to count on the ready co-operation of the farmers, whose difficulties we fully appreciate. (*National Food Journal*, 23rd October, 1918.)

Colonel Wheler asked the Parliamentary Secretary to the Ministry of Food, on 29th October, if he had received a resolution from the Central Associated Chambers of Agriculture protesting against the breach of faith with farmers by the recent action of the Ministry of Food in sending back from the markets fat cattle and sheep and refusing to allow them to be sold although ripe for the butcher, and asked what action he proposed to take in the matter.

Mr. Clynes: The answer to the first part of the question is in the affirmative. As was stated yesterday, the holding back of cattle at the present time is the only policy which will secure the necessary meat ration for the first five months of next year No undertaking was ever given to accept all stock which farmers might desire to sell regardless of national requirements, and there is, therefore, no breach of faith involved. Any additional expenditure will be met by the increased maximum prices which have now been sanctioned. I am confident that farmers will meet this difficult situation with the resource and energy which they have already displayed.

The Common Honey Bee as an Agent in Plum Pollination.

BULLETIN No. 274 of the *College of Agriculture, Agricultural Experiment Station, University of California*, contains an account of an experiment carried out in the Santa Clara Valley, and which forms part of a series undertaken to determine why, under certain conditions, some plums bear abundant crops and under other conditions bear light crops or none at all.

In a large orchard two pairs of adjacent Frencb and Imperial plum trees, as nearly as possible of the same age and size, were enclosed in a tent of white mosquito net, so as to exclude all insects. In every other way the trees were under the same conditions as the other trees in the orchard. The tents were put up before any of the blossoms opened, and taken down when there was no longer any danger of outside pollination. As soon as 25 per cent. of the blossoms had opened a hive of bees was placed under one tent, and kept there throughout the blossoming period (about five days). The bees seemed to prefer the flowers of the French plum to those of the Imperial plum. The resnlts are given in the following table :—

Trees.	No. of Blossoms Counted. 11th April, 1916.	No. of Fruits Matured. 1st August, 1916.	Percentage.
French plum under tent with bees..	1069	193	18·05
,, under tent from which bees were excluded	1058	11	1·94
French plums, average orchard set..	9991	359	3·59
Imperial plum under tent with bees..	1060	18	1·89
,, under tent from which bees were excluded	1050	0	0
,, average orchard set	2180	157	7·20

It is seen that the French plum under the tent with the bees set a much higher percentage of fruit than the other trees. The light crop obtained from the Imperial plum under the tent with the bees is unaccounted for, and it is intended to carry out further experiments to determine the cause.

The results show the honey bee to be one of the most important factors in carrying pollen from one tree to another. The most satisfactory method of introducing bees into orchards has not yet been decided, but it seems that the best results are to be obtained by placing about one hive to the acre during the blossoming period, after which the hives could be removed.

Food Value of Nettles.

THE yonng shoots of nettles have long been used as a vegetable cooked like spinach or as a constituent of soup, though in recent times this practice seems to have become almost extinct. Nettles have also been used, chiefly in the cooked state, as pig's food; formerly, it was a common practice to cut nettles and cook them for pig's food, and in some cases they formed quite a large part of the food of the

In view of these facts, and of the desirability of making use of all suitable foods during the present difficult times, a series of analyses was made by Professor Hendrick of nettles gathered at different stages of growth. The analyses show that young nettles up to the end of May, when they are 12 to 18 in. high, form a rich and valuable feeding-stuff. In the dry state they contain as much albuminoid material as linseed cake, and they also contain a fair proportion of substances extracted by ether which largely consists of fats. The ash is also high, but its composition has not yet been examined in detail. After May the nettles grew very rapidly, and when sampled early in July they were almost 5 ft. high, and were in flower. At this stage it was found, as was expected, that the fibre and soluble carbohydrates had increased. The material was still highly nitrogenous for a vegetable product, and contained a much higher percentage of nitrogen than, for instance, grasses. Dried nettles, therefore, at flowering stage contain considerably more albuminoid than ordinary hay, and are quite as rich as hay obtained from leguminous crops.—(*National Food Journal*, 11th September, 1918.)

Notes on Allotments.

Allotments and the Cultivation of Lands Orders.—The Food Production Department directs the attention of allotment holders and local authorities to the fact that the Board of Agriculture have lately issued the Cultivation of Lands (Allotments) Order, 1918,* to supersede the Cultivation of Lands Order, 1917. Among the provisions of the Order is one which enables a Borough or Urban District Council, or the London County Council, to enter on land, including the buildings thereon, for the purpose of using it for the keeping or breeding of poultry or bees, or arranging for its use for this purpose. A Council may so enter on land without any further sanction of the Board of Agriculture. If a Council desires, however, to enter on land for the purpose of using it for the keeping or breeding of "livestock," such as pigs, the express sanction of the Board must be obtained and such sanction must also be obtained if it is desired to use land already entered upon for keeping livestock. Given this sanction a Council may arrange for the use of land for any of the purposes named by any person, either under a contract of tenancy or otherwise. Security of tenure is provided until the expiration of two years from the end of the War," except in those cases where it is shown to the satisfaction of the Board that the land is required before that date for building or other special purposes, or where the compensation payable if the land is retained would be greatly in excess of the value to the nation of the food produced."

It has been brought to the notice of the Food Production Department that a strong desire exists on the part of many plotholders that wherever possible land for allotments should be secured on lease for a term of years, so that the plotholders may have greater security of tenure than is provided for under the Corn Production (Amendment) Act and the Defence of the Realm (Acquisition of Land) Act, 1916.† "The large extension of the allotment movement during the War, particularly in the urban areas, has been a development of the utmost

* Printed in this *Journal*, September, 1918, p. 718.

value both to the nation and to the plotholders themselves," says an official circular to the local authorities, "and the Board of Agriculture are anxious that the movement should be established on a permanent basis." It is suggested, therefore, that the local authorities wherever desirable and possible should negotiate with the owners of land taken for allotments under the Cultivation of Lands Order with a view to acquiring it on lease under the provisions of the Small Holdings and Allotments Act, 1908.

It may not be possible in all cases to secure a tenure for a definite number of years; but the President of the Board (Mr. Prothero) feels sure that many landowners will be willing to consider favourably applications for a lease. He advises that local authorities should proceed on these lines alike as regards land already in their possession under the Order and any additional land that may he required. He hopes and believes that there will be a considerable further extension of the allotment movement, with which he and his Board are in the most cordial sympathy. "It has been of great benefit to the nation at a time of serious crisis," testifies the Food Production Department, "and has assisted materially in relieving the anxieties of the Government in the realms of shipping and finance by making use of part-time labour in the work of increasing production of food at home."

The financial side of the allotment movement has been rather anomalous in many districts, and in the official view the time has now arrived when this matter should receive attention. At the time the earliest of the Cultivation of Lands Orders was made it was anticipated that the plots might have to be given np within a year or so. As an adequate return for the labour and expenses necessary to cultivation could not in all cases be expected within that period, the Board of Agriculture undertook to pay any deficit on the allotments up to a maximum of £2 per acre—under certain conditions up to £3 per acre incurred by a Council in providing or adapting land for cultivation. Some local authorities have assumed that £2 per acre would be granted in all cases and have made no effort to put the allotments on a paying basis. Mr. Prothero considers it reasonable that economic rents should be paid in future and asks local authorities to give this matter their careful and early consideration.

Allotment Progress.—During the week ended 18th October, local authorities agreed to lay out more new allotments than for many weeks past. The area concerned was 316 acres and the number of plots upwards of 4,300. Manchester and Barnsley head the list with 46 and 41 acres respectively; Bedford is next with 33½ acres; Ashington fourth with 32 acres; Hove fifth with 24½ acres, and Wigan and Tamworth equal sixth with 20 acres each. Other places in the list are Tredegar, 14 acres; Newton-in-the-Isle, 13 acres; Reading and Broughton (Lincs), 10 acres each; Birmingham, 2½ acres; Wimbledon, 8½ acres; Ipswich, Richmond (Yorks), and Ripon, 5 acres each; Plymouth, Norton, and Whickham, 4 acres each; Smallthorne and Welshpool, 2 acres each; Windsor, 1½ acres; Bungay and East Dereham 1 acre each.

Fertilisers for Allotments.—Allotment holders who are anxious about their fertiliser supplies should communicate at once with the secretary of their association, if they are members of an association; if not, they should apply to the Horticultural Sub-Committee of the County Executive Committee in which they reside. The Horticultural

Sub-Committee will then put them in touch with one of the fertiliser agents approved by the Food Production Department. These agents are stocking certain quantities of superphosphate, basic slag, and sulphate of ammonia, specially to meet the requirements of allotment men and other small growers. Some of the agents are also storing a certain amount of blast furnace flue-dust, which is a potassic fertiliser and can be used for the purposes for which kainit was formerly used. Small growers should not wait until the spring before ordering their superphosphate; they should do this at once. If orders are deferred difficulty may be experienced in obtaining supplies. Moreover, prices are officially fixed on a sliding scale so that the sooner supplies are bought the cheaper they are. The Food Production Department is in communication with the Horticultural Sub-Committees with a view to the prompt delivery of fertilisers, economy in the use of bags, etc., and allotment men can greatly facilitate the work of the Department by following its advice to order immediately.

Question in Parliament.—In replying to a question in Parliament on 17th October, as to the advisability of forming a Committee to provide sufficient land in the form of allotments to produce food for each household, Mr. Prothero stated that the Board of Agriculture possess the necessary powers for the provision of land for allotments, and have delegated them to the Agricultural Executive Committees and to the Urban Local Authorities. These powers are being exercised freely wherever there is a demand for more land for allotments.

In regard to whether local councils can be given power in future to borrow money for the specific purpose of the freehold purchase of land in order to lease it for food production, Mr. Prothero said that power to purchase freehold land for small holdings and allotments is already provided by the Small Holdings and Allotments Act of 1908. It was there in abeyance owing to the fact that the Government have discontinued making advances out of the Local Loans Fund for such purposes during the War.

He further stated that a special branch of the Food Production Department of the Board is already charged with the duty of promoting the allotment movement. Every information as to allotments will be supplied on application to the Director-General of Food Production at 74, Victoria Street, London, S.W. 1.

The Agricultural Organisation Society: Question in Parliament.

IN replying to a question in Parliament on 21st October, respecting the relationship of the Agricultural Organisation Society to the Board of Agriculture, and the grants made to the Society in aid of allotments, the President of the Board stated that the Society holds no official position under the Board of Agricultnre or the Food Production Department, but that it receives grants in aid of its work through the Board. In regard to grantsmade to the Society during the War for the purpose of promoting allotments, the amount of grant made this year is £10,000. This grant is administered through the Food Production Department, and the whole of it may be said to be available by the Society for stimulating co-operative trading, so far as that can be done by (1) supplying organisers to address meetings of allotment-holders on the advantage to themselves and to the State derived from organisation on co-operative

lines; (2) assisting in the formation of societies among allotment-holders; (3) advising societies in their trading and other operations. The grants to the Society in the earlier years of the War were applicable both to the promotion of agricultural co-operation generally and to co-operation among allotment-holders. These grants were as follows:—

—	1915-16.	1916-17.	1917-18.	Totals.
	£	£	£	£
Payments by Treasury from Development Fund	9,290	6,925	13,240	29,455
Payments by Board from Small Holdings Account	2,000	1,988	2,000	5,988
Totals	11,290	8,913	15,240	35,443

It should be mentioned also that the grant to the Society from the Small Holdings Account for the current year is £4,000, of which £1,000 is applicable to the Society's allotment work.

As regards the control exercised by the Board over the operations of the Agricultural Organisation Society, the control is exercised partly by means of definite conditions attached to the grants of Government money, and partly through the constant touch which is maintained between the Department and the officers of the Society, and through the work of the two nominees of the Board who sit on the Executive Committee of the Society. The grants to the Society are, moreover, annual, and the work of the Society comes up automatically for review every year.

Women's Work on the Land.

Popular Land Women.—The demand for woman labour still exceeds the supply. There is at the moment an increased demand also for women milkers. A number of women trained in this work have for some weeks been drafted to other employment as there were no vacancies for them as milkers. They will, however, be withdrawn from any other work on which they are at present employed so soon as sufficient women are set free from potato gangs to replace them.

Successful Woman Thatcher.—A woman thatcher, trained in Essex, has been employed with much success, and is already booked in advance by two more farmers so soon as her present job is finished. Many women are doing good work as thatchers; and further facilities are to be afforded for the training of women in thatching.

Land Women's Efficiency Test.—An interesting efficiency test was held in West Suffolk during the week ended 18th October, the first such test held in the county. It was conducted on the farm of the Chairman of the War Agricultural Committee, and three other farmers assisted in judging. The girls were examined in milking, ploughing, root pulling, manure loading, sprayir
were tested and only one failure in o

Women's Training Farm.—A fa
Essex by Miss Bowen Colthurst, for

Cultivation of German Waste Land and Moors.

At a meeting of the Society for the Promotion of the Cultivation of Moors, held at Berlin, an interesting report was read of the progress made in cultivation in the different districts. The *Weser-Zeitung* (28th February) calls attention to it. The original difficulties as to the cultivation of waste lands have been met. Some 417 associations have been formed, covering a tract of hct.156,173, and 4,335 private individuals have taken over hct. 15,740 on Government terms. The cost of reclaiming these hct.172,000 is estimated at Mk.66 mill.* It has been impossible to keep up the splendid start made in this work, but interest has been aroused and, when peace comes, fresh progress will be assured. The economic measures necessary during and after the War for cultivation of waste lands were pointed out at the meeting. The shortage of labour would prevent more intensive culture. It was imperative that every farm should plant the crops and feed the stock for which it was best adapted. Meadows and pasture land must be extended and root crops developed as far as possible. It is important in order to save labour that roots be grown near the farm buildings and that crops of various kinds be planted which do not all ripen at the same time. It was also shown that two possible methods of developing the cultivation of moors existed: taking into cultivation suitable waste lands, and increasing the productivity of moors already reclaimed. The national and political importance of this form of cultivation is great, since it creates industries for the lower- and middle-class peasant and adds to the numbers and strength of the nation. The economic value of the movement is obvious, and it was urged that the State should help it in every way by appropriate legislation and organisation. (*Reconstruction Supplement to the Daily Review of the Foreign Press*, 9th April, 1918.)

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1*d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1; 37, *Peter Street, Manchester*; *and* 1, *St. Andrew's Crescent, Cardiff.*

Use of Tractors.

THE following Circular Letter (No. C.L. 282/M. 6) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 7th October:—

SIR,—It has been brought to the notice of the Department that in certain districts extensive contracts for tractor ploughing have been made by Committees with the larger farmers, with the result that the smaller men are unable to obtain the use of Government tractors to the extent they

* 156,173 hct. = 386,00 acres; 15,740 hct. = 39,000 acres; 172,00[illegible]

desire. The Department realise that in planning the work for the present season it has been necessary in some instances to accept requests which have been made in good time by larger farmers, and to arrange for their work to be done at an early date in order to guard against the possibility of tractors standing idle, but in accepting future contracts Committees will doubtless bear in mind not only the importance of assisting the smaller farmers but the desirability of avoiding any appearance of preferential treatment of the larger farmers. The larger farmers are for the most part better able to help themselves, and should be encouraged to buy their own tractors rather than use Government-owned machines.

Cases have come to the notice of the Department in which farmers are selling their horses and relying upon Government tractors to do their work. Such action does not help food production, and the assistance of Government tractors should not be given in those cases.

I am, etc.,
(Signed) R. SOTHERN HOLLAND,
Controller, Cultivation Division.

THE following information (Ref. No. C. L. 142/L. 2) was circulated to Agricultural Executive Committees by the Food Production Department of the Board on 25th October :—

War Agricultural Volunteers.

1. *Applications of Men to be Enrolled as War Agricultural Volunteers for Assignment to their Existing Employment or Existing Employer* :—(*a*) Application should be refused from men who were principally and usually engaged in agriculture on 28th May, 1918. Such men will continue to be dealt with under the arrangements regarding the issue of agricultural vouchers.

(*b*) *Applications may be accepted from men who entered agriculture* after the 28th May, 1918, subject to the applicant being otherwise eligible for enrolment and protection as a War Agricultural Volunteer and to the vacancy being approved by the Agricultural Executive Committee as one for which a War Agricultural Volunteer would be required. In this instance applicants may claim subsistence allowance only and *not* daily travelling allowance. The Enrolment Form should be amended accordingly before being signed by the man.

(*c*) Applications may be accepted from men who are employed on *non-agricultural work*, to be enrolled and assigned to the same employer for employment on *agricultural work*, subject to the conditions laid down in (*b*) above. In these cases particular care should be taken by the Agricultural Executive Committee or Exchange to whom the man applies for enrolment, that the employer signs the usual undertaking (Form W. A. V. 19) that the man will be employed " solely on agricultural work."

2. *Procedure for Dealing with National Service Volunteers Placed in Agriculture who Leave their Agricultural Jobs*—Any man who was placed as a National Service Volunteer in agriculture can, on leaving his National Service Volunteer job, be enrolled as a War Agricultural Volunteer, notwithstanding his having been engaged in agriculture on

the 28th May, 1918. Such men, if of military age, will ordinarily be in possession of some form of exemption or protection from military service. They may accordingly be enrolled irrespective of age and medical grade, but they will not be entitled to protection from military service solely as War Agricultural Volunteers unless they satisfy the conditions under which War Agricultural Volunteer Protection Certificates are issued.

3. *Occupations in which Men may be Placed as War Agricultural Volunteers.*—Agricultural Executive Committees should note that men may only be placed as War Agricultural Volunteers in any of the occupations in respect of which agricultural vouchers can be issued.

4. Particular attention is called to paragraph 12 of F. P. 278/L. 2* requiring that the original Forms W.A.V. 1 and W.A.V. 17A should be forwarded to the Ministry of National Service. Delay in forwarding these Forms may entail delay in the refund of any allowances paid by Agricultural Executive Committees on behalf of the Ministry of National Service.

THE following Notice (No. C. L. 286 (*a*) /M. 12) was addressed by the Food Production Department of the Board on 14th October :—

Employment of Prisoners of War on Threshing Work.

It is most desirable in the national interest that the services of prisoners of war should be used to the greatest possible extent for threshing. These men can be obtained in the following ways :—

1. **From Central Agricultural Depots.**—There are at the present time 330 depots in various parts of the country from which prisoners of war are sent out daily under the direction of the County Agricultural Executive Committee for agricultural work. Each of these depots contains 30 or more prisoners of war. By arrangement with the Agricultural Executive Committee gangs of men can be supplied for work within easy distance of the depot, the prisoners returning to the depot each night. The prisoners are required to walk a distance of 3 miles each way if necessary ; over this distance a conveyance must be provided by the employer unless conveyances are already attached to the depot.

Many prisoners at these depots claim to be skilled threshing engine drivers and feeders, and sets could, therefore, be worked wholly by prisoner labour within a 3- to 5-mile radius of the depots. If in the case of any particular depot the skilled men required are not available, men of the required type can be transferred from another depot where there is a surplus. In the event of owners of idle machines being unwilling to employ prisoners as drivers, etc., the County Agricultural Executive Committee will consider whether the machines should be taken over and worked by prisoner labour under their control.

The services of prisoners working under the above scheme are paid for at local rates by employers direct to the Commandant, the hours actually worked being charged for. The prisoners will be rationed by the military authorities.

2. Prisoners Boarded and Lodged on Employers' Premises.—Not more than three German prisoners can be sent out without guard to be boarded and lodged on the employer's premises on application to the County Agricultural Executive Committee. Employers must be responsible for the men and conform to certain rules laid down by the military authorities. They must never be lodged away from the employer's premises, and outside working hours must not be allowed more than half-a-mile away from their lodging. This scheme enables a machine to be worked by a prisoner driver and feeder within daily travelling distance of the threshing machine owner's own premises where he has accommodation for the men. Payment must be made at current weekly rates to the Commandant, less a deduction (at present 15*s.* a week) for cost of board and lodging.

Prisoners cannot be sent out under this scheme to premises situated in prohibited areas, *i.e.*, places near the coast, munition areas, etc. Employers in doubt as to whether they are in a prohibited area or not should communicate with the County Agricultural Executive Committee.

3. Proposed Scheme for Provision of Migratory Gangs.—A scheme has been submitted to the War Office for the provision of gangs of 10 prisoners and two guards, to be accommodated in lock-up buildings selected by the County Agricultural Executive Committee, each gang to be attached to one or more threshing machines and to be moved from farm to farm with the machines. In the event of the War Office being able to sanction the scheme, a further Memorandum will be issued.

It is particularly to be noted in connection with the use of prisoner labour for threshing that in no circumstances are Women of the Land Army and prisoners to be employed on the same threshing set.

THE following Memorandum (No. C. L. 143/L. 1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 25th October :—

Prisoners of War: Migratory Gangs. With reference to the Memorandum C. L. 139/L. 2,* as to the retention or substitution of migratory gangs of prisoners of war for the potato harvest, the War Office have now notified all Commands (Ref. No. 2,337 P. W. 3) that migratory gangs already out or replaced by prisoners of war from parent camps, may remain out until further notice for any urgent agricultural work such as threshing. Commands have, however, been informed that for the present it is to be understood that the total number of prisoners of war detailed for such migratory gangs from parent camps is not to exceed the number of prisoners from non-agricultural camps recently withdrawn at the conclusion of corn harvest work.

Committees may, therefore, apply to the Command concerned, through the Area Commandant, for the formation of migratory gangs of prisoners required for threshing work, but the Command will not be able to supply a total number of prisoners in excess of the number who were engaged

THE following Notice was issued by the Food Production Department of the Board on 16th October :—

Ploughmen for Autumn Cultivation.

Farmers will be pleased to hear that the Food Production Department has been able to arrange with the Military Authorities that soldier ploughmen belonging to Agricultural Companies who have been recently graded "A" are not to be withdrawn from the farms for the present, even though substitutes have already been provided by the Military Authorities. The War Office has also informed the Department that every effort will be made to find an additional number of skilled ploughmen to assist in the autumn work. To this end inquiries are being made into the number of ploughmen serving in the Army at home who can be made available for sending out on two months' agricultural furlough.

IN reply to a question in Parliament on the 22nd October, Mr. Prothero stated that the area of arable land this year in England is 11,463,679 acres, in Wales, 934,961 acres, and in Scotland, 3,452,156 acres. He understood that the area of ploughed land in Ireland this year was 3,240,710 acres.

Tillage and Arable Land: Question in Parliament.

He further stated that the Board desire that, as far as labour is available, the acreage of tillage should be increased, in order to obtain an additional output of corn, including beans and peas, at the harvest of 1919. The Board look for every effort on the part of the farmers with this essential object in view.

THE Food Production Department recently issued a warning to farmers of the danger of sowing wheat infested with ear cockles, since a comparatively slight infestation may seriously reduce the yield of the crop. From samples received at the Seed Testing Station, however, it is evident that cockle-infested grain is fairly prevalent in certain districts such as the south-western counties and parts of Wales; and where there are strong reasons for using such wheat for sowing, farmers should primarily remove as many of the "cockles" as possible. This may be done by floating them out. The operation needs care. When the wheat is first placed in water, only a certain proportion of the cockles float. The remainder sink; but later, after soaking for about three-quarters of an hour or less, they also float. The treatment recommended, therefore, is to stir the wheat thoroughly in water for five minutes. All cockles rising should then be skimmed off. The wheat should be allowed to remain in the water for three-quarters of an hour, stirring thoroughly at intervals of five minutes At the end of three-quarters of an hour, any further cockles which have risen should be skimmed off. The wheat may then be dried ready for sowing. While the wheat is being treated, thorough stirring is important. The depth of wheat in the vessel should not be greater than necessary, as it is

Ear Cockles in Wheat*

* An article on Ear Cockles in Wheat was published in this *Journal*, October, 1918, p. 850.

ıaturally more difficult for cockles to rise through a great depth of wheat. If desired, wheat may be dressed against bunt at the same time by steeping it in a 1 per cent. copper sulphate solution (1 lb. in 10 gal.) ınstead of water.

THE following Press Notice was issued by the Food Production Department of the Board on 21st October :—

The Damaged Harvest: Need for Testing of Cereals.

In view of the large amount of damaged grain this season the Food Production Department would urge upon farmers the importance of having their cereals tested before relying upon them for seed purposes. Farmers desiring to send grain to the Food Production Department's Seed Testing Station to be tested are asked to forward their samples *immediately after threshing*.

Samples shou d not be less than 4 oz. in weight, and a fee of 3*d*. should accompany each sample; unless a declaration is required for the purpose of a sale, in which case the fee payable is 1*s*. per sample.

Envelopes for forwarding samples may be obtained on application to the Seed Testing Station, 70, Victoria Street, London, S.W. 1.

THE following Circular Letter (No. C.L. 47/S. 5) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 29th October :—

Testing of Seeds Order, 1918.

SIR,—Representations have been made to the Department that the requirements of the Testing of Seeds Order* have not been adequately brought to the notice of farmers who are selling seeds to their neighbours. It is important that farmers should know the quality of the seed they sow, whether it be bought from a seed merchant or from another farmer, and I shall be glad if your Committee will do all they can to make known the requirements of the Order in your county.

The particulars which must be declared under the Order are set out fully in Food Production Leaflet No. 47, also in a shorter form in Notice No. F.P. 345/S. 5,† and still more briefly in a Poster (F.P.390/S.5), a copy of which is enclosed,‡ together with copies of the Leaflet and Notice.

It will be very helpful if your Committee will be so good as to arrange for copies of the Poster to be displayed on notice boards at markets and other suitable places. I shall be glad to send you supplies of this Poster, if you will let me know how many copies you can usefully exhibit. Copies of the Leaflet and Circular will be sent at your request for distribution as you may require them, to meet farmers' requests for copies. When you reply, please mark envelopes "Seed Control Section."

I am, etc.,
(Signed) LAWRENCE WEAVER.
Controller of Supplies.

ENCLOSURE (F.P. 345/S.5.)

TESTING OF SEEDS ORDER 1918.

The particulars which must be declared under the Order are marked (X) *in the columns below.*

Kind of Seed.	Name and Address of Seller.	Country of Origin.	Purity per cent. by Weight.	Variety.	Impurities. Total per cent. by Weight of Injurious Weeds if over 1 per cent.	Impurities. Whether Dodder is present. If more than 1 Seed in 2 oz.	Impurities. Whether Dodder is present. If more than 1 Seed in 4 oz.	Number per cent. of Hard Seeds.	Total Germination per cent. by Number.	Standard of Germination.	Date of Test (unless made within six months of sale).
Perennial Rye Grass	X	X	X	..	X	..	..	..	X	..	X
Italian Rye Grass	X	X	X	..	X	..	..	..	X	..	X
Cocksfoot	X	X	X	..	X	..	..	..	X	..	X
Meadow Fescue	X	X	X	..	X	..	..	..	X	..	X
Timothy	X	X	X	..	X	X	..	..	X	..	X
Red Clover	X	X	X	X	X	..	X	X	X	..	X
Alsike	X	X	X §	X	X	X	..	X	X	..	X
White Clover	X	X	X §	X	X	X	..	X	X	..	X
Crimson Clover	X	X	X	X	X	..	X	X	X	..	X
Trefoil	X	X	X	X	X	..	..	X	X	..	X
Lucerne	X	X	X	X	X	..	X	X	X	..	X
Sainfoin	X	X	X*	X	X	..	..	X	X	..	X
Crested Dogstail	X	..	X	..	X	..	..	..	X	..	X
Wheat	X	..	..	X	..	..	..	..	X‡	90	X
Barley	X	..	..	X	..	..	..	..	X‡	90	X
Oats	X	..	..	X	..	..	..	..	X‡	85	X

Rye	X	..	..	X	..	..	..	..	X‡	80	X
Tares or Vetches	X	..	X†	..	X	..	..	..	X	..	X
Mangold	X	..	X†	..	X	..	..	..	X	..	X
Swede	X	..	X†	..	X	..	..	..	X	..	X
Rape	X	..	X†	..	X	..	..	..	X	..	X
Turnip (Field)	X	..	X†	..	X	..	..	..	X	..	X
Cabbage ,, ...	X	..	X†	..	X	..	..	..	X	..	X
Kale ,, ...	X	..	X†	..	X	..	..	..	X	..	X
Kohl Rabi	X	..	X†	..	X	..	..	..	X	..	X
Pea	X	..	X†	..	X	..	..	..	X‡	75	X
Dwarf and Broad Beans	X	..	X†	..	X	..	..	..	X‡	80	X
Runner Beans	X	..	X†	..	X	..	..	..	X‡	65	X
Parsnip	X	..	X†	..	X	..	..	..	X‡	50	X
Onion	X	..	X†	..	X	..	..	..	X‡	65	X
Carrot	X	..	X†	..	X	..	..	..	X‡	60	X
Beet	X	..	X†	..	X	..	..	..	X‡	100	X
Turnip (Garden)	X	..	X†	..	X	..	..	..	X‡	80	X
Cabbage ,, ...	X	..	X†	..	X	..	..	..	X‡	75	X
Kale ,, ...	X	..	X†	..	X	..	..	..	X‡	75	X
Kohl Rabi ,, ...	X	..	X†	..	X	..	..	..	X‡	75	X
Cauliflower	X	..	X†	..	X	..	..	..	X‡	70	X
Brussels Sprouts	X	..	X†	..	X	..	..	..	X‡	75	X
Broccoli	X	..	X†	..	X	..	..	..	X‡	75	X

* State per cent. where more than 5 per cent. by weight of Burnet is present.

† If the percentage of purity is above 97 per cent. a statement to that effect is sufficient, but if below this Standard the actual percentage must be declared.

‡ If germination is at or above the Standard of germination specified a statement to that effect is sufficient, but if below this Standard the actual percentage must be declared. In the case of packets of Peas or Beans (not exceeding 2 lb.) or of the Garden Turnip, Garden Cabbage, Garden Kale, Garden Kohl Rabi, Brussels Sprouts, Broccoli, Cauliflower, Carrot, Parsnip, Beet, or Onion (not exceeding 8 oz.), no declaration is required if above specified Standard, and if below the Standard a statement to that effect is sufficient.

§ If the percentage of Suckling Clover (*Trifolium dubium Sibth.*), Hop Clover (*T. procumbens L.*), *T. parviflorum Ehrh.*, *T. angulatum Waldst.*, and *T. glomeratum L.* exceeds 2 per cent. by weight the exact percentage must be declared.

A Leaflet dealing with the Testing of Seeds Order, 1918 (Food Production Leaflet No. 47), may be obtained *free* and post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

THE following Notice was issued by the Food Production Department of the Board on 11th October:—

Potato Spraying Campaign.

Between 1st November, 1917, and 1st August, 1918, over 14,500 knapsack and other spraying machines were bought in Great Britain for the purpose of potato spraying. These sales compare with 12,000 machines sold between 1st November, 1916, and 1st August, 1917. Roughly, the two years mentioned cover the period of the Food Production Department's spraying propaganda. The average pre-war sales of machines were less than 1,000 yearly. It will be noticed that in 1917, when the Department supplied machines direct to buyers, there was an increase of about 1,100 per cent. in the demand; that this year, when the sprayers have been supplied through the trade, there has been a still further increase. These increases may fairly be attributed to the official propaganda in favour of spraying potatoes. The demand for horse-drawn sprayers for spraying either potatoes or charlock has also been materially stimulated by the lectures and demonstrations given by the Food Production Department. Between January and July this year 1,370 lectures and 947 demonstrations were given.

Spraying trials carried out at Christchurch offer significant evidence in favour of the efficacy of spraying. Scotch Up-to-Date seed was planted—the sets 16 in. apart in the rows, and the rows 2½ ft. apart. The crop was lifted on 28th September, and the yields were:—1 rod, unsprayed: total weight, 287 lb.; healthy tubers, 226 lb.; blighted tubers, 61 lb. One rod, sprayed (three times): total weight, 401 lb.; healthy tubers, 345 lb.; blighted tubers, 56 lb. Blight was general on the unsprayed land on 22nd August; on sprayed land not until 17th September.

The Wart Disease Peril: Potato Show at Ormskirk.

THE alarming spread of wart disease, or black scab, of potatoes in recent years—and especially in the past twelvemonths—invests with a special interest this year's experimental work at Ormskirk, and the potato show at the same place, which was held on 30th October. It is generally known that for a number of years the Board of Agriculture have been conducting tests of the varieties of potatoes classified as "immune from wart disease" and endeavouring to discover new immune varieties. Outside trade and official circles, however, it is not fully realised on what an extensive scale and in how thorough a manner the investigations of the Board have lately been carried out.* Still less is the general public aware of the important schemes which are in hand for developing and systematising national research into the diseases which affect the plants of the farm, and in particular the potato. The large and representative gathering of growers, raisers, and

* See articles in this *Journal*, November, 1917, p. 801 September, 1918, p. 713.

nerchants attending the show on the 30th October, were ıble to see for themselves some part of the results already ıchieved; and Lord Bledisloe (until recently, Sir Charles 3athurst), in opening the show, explained briefly the plans of the Board for the future, whilst warmly commending to the support of his hearers the scheme for a National Institute of Agricultural Botany.*

In his address, Lord Bledisloe said that for five years past the Board of Agriculture had been conducting experiments with a view to the eradication of wart disease. These experiments were to be continued on a larger scale. The future of the potato-growing industry in this country was full of promise. During this War for the first time the Government of the day had begun to interest itself in the culture of the potato.

New Board of Agriculture Farm for Experiments.—The Board had recently purchased a farm for experimental purposes. The agricultural and industrial potentialities of the potato were practically unlimited, given a larger measure of research on the right lines and the co-operation of everybody concerned with the industry. It was proposed to make Ormskirk the permanent home for potato trials on a scale worthy of this country. The farm would cost anything from £5,000 to £10,000 properly to equip, but his Lordship was confident that the sum required would be subscribed by growers, raisers, and merchants interested in the encouragement of the cultivation of potatoes and cereals on up-to-date lines. He announced that Mr. Poad, of York, had contributed £500; Mr. Gardiner, of Perth, £100; and Mr. Alfred Birch, of Liverpool, £50. It is understood that numerous other promises of support to the National Institute of Agricultural Botany were subsequently made.

The Board of Agriculture have recently issued a revised edition of Leaflet No. 105 on Wart Disease, containing a life history of the fungus, a description of the methods by which the disease may be spread, hints on control measures, and a brief summary of the Wart Disease Order of 1918.† Free copies can be obtained from the Board of Agriculture, 3, St. James's Square, London, S.W. 1.

* See articles in this *Journal*, July, 1918, p. 383, August, 1918, p. 519.
† Printed in this *Journal*, May, 1918, p. 211.

THE following Notice was issued by the Food Production Department of the Board on 25th October :—

The Supply of Seed Potatoes.

The President of the Board of Agriculture having given careful consideration to the question of the distribution of seed potatoes of the 1918 crop in England and Wales, has decided that the Board shall leave the supply to the ordinary trade channels.

It will be remembered that the scheme of distribution by the Food Production Department was introduced in the season 1916–17* when the supply of "seed" was extremely limited and in order to overcome the difficulties of the allotment holder and cottager in obtaining suitable potatoes for planting. This scheme was put into operation again in 1917–18† in order to demonstrate further the value of change of "seed."

Mr. Prothero is of opinion that the objects which the Department had in view have now been secured, and that the prospects of the present potato harvest yielding an ample supply of good "seed" are such as to remove the justification for the amount of Government interference involved in the distribution of "seed" by Agricultural Executive Committees during the coming season.

An Order relating to the sale and distribution of seed potatoes will shortly be issued by the Ministry of Food, by which maximum prices (*a*) paid to the grower and (*b*) charged by wholesale and retail dealers will be fixed for different classes and varieties. Under the Order it will be possible for small growers to obtain their requirements either direct from the grower or through ordinary trade channels. In any case, where a society or group of small growers finds difficulty in obtaining supplies the Department will be prepared to give information as to reliable sources.

Concessions to Retailers of Onions.

The Food Controller has issued General Licences (Orders Nos. 1304 and 1303 respectively) under the British Onions Order, 1918,‡ and under the Imported Onions Order, 1918,§ authorising persons who have dealt as retailers in onions and also persons who have purchased imported onions direct from a licensed broker to continue to do so until further notice. The Food Controller also postponed the dates by which brokers and grower dealers have to apply for registration until 1st November, 1918. Both the British Onions Order, 1918, and the Imported Onions Order, 1918 stand, however, so far as any other persons are concerned.

The British Onions Order, 1918.

AN Order (No. 1236), dated 1st October, 1918, has been made by the Food Controller fixing maximum prices of British Eating and Pickling Onions of the 1918 crop. The Order defines "eating onions" as those which will not pass through a riddle having 1¼-in. mesh, and "pickling onions" as those onions which will pass through a riddle having a 1¼-in. mesh. Onions must be sold by

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* See this *Journal*, February, 1917, p. 1141.
† See this *Journal*, November, 1917, p. 900.
‡ See below.

weight, and pickle makers must not use eating onions for making pickles. *It is an offence to sell British onions mixed with any other onions or* to misrepresent or falsely describe British onions as imported onions or imported onions as British onions.

The maximum prices are as follows :—

EATING ONIONS.

Time of Delivery.	Growers' Maximum Price f.o.r. or f.o.b.	Retail Prices.		
		Sales of 1 cwt. or more, per cwt.	Sales of 1 st. or more, but less than 1 cwt., per stone.	Sales of less than 1 st. per lb.
1918.	£	s.	s. d.	d.
Before and on 31st Oct.	28	34	4 5	4½
1st Nov. to 30th Nov. ..	29	35	4 6	4¾
1st Dec. to 31st Dec. ..	30	36	4 8	4¾
1919.				
1st Jan. to 31st Jan. ..	32	38	4 11	5
1st Feb. to 28th Feb. ..	34	40	5 2	5¼
1st Mar. to 31st Mar. ..	36	42	5 5	5½
1st April and after ..	38	44	5 8	5¾
PICKLING ONIONS.				
Any time	30	36	4 8	4¾

Onions sold by growers not separated must, if sold for delivery on or before 31st December, be sold at prices applicable to eating onions, and after 31st December, at prices applicable to pickling onions.

The maximum wholesale dealer's profit is 35s. per ton, and if the onions pass through the hands of more than one wholesale dealer this profit must be shared.

Growers who carry on separate businesses as wholesale dealers may apply to the Director of Vegetable Supplies, 100, Cromwell Road, London, S.W. 7, for licences to sell their own onions as wholesale dealers. Onions may be sold by retail only by registered retail dealers in eating potatoes or by growers whose total crop of onions is not more than 10 cwt. Retail dealers may charge ¼*d*. per lb with a maximum of 2*d*. for delivery to consumers. This Order does not apply to shallots, potato onions, *or to onion sets sold for planting.* All contracts are cancelled, except in respect of deliveries prior to 7th October, 1918

This Order came into force on 14th October, 1918.

THE *following Notice was issued by the Joint Committee of the* Board of Agriculture and Ministry of Food on 16th October :—

The Price of Meat and Offals.

At a meeting of the Central Agricultural Advisory Council, held on 17th September, the following resolution was passed :—

" That it be a recommendation to the Food

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for the offals of cattle and sheep sold by them on the dead-weight basis by the sum of ½*d.* per lb. carcass weight, or alternatively that breeders should be paid the wholesale prices realised for such offals."

We understand that this resolution has been given very careful consideration by the Food Controller and replied to as follows :—

The Food Controller regrets that the principle involved cannot be accepted. The price of 75*s.* per cwt is exactly equivalent (or as near as can mathematically be computed) to the price of 1*s.* 0¼*d.* per lb. for the meat, plus 2*d.* per lb. on the dressed weight for the offals, on a 10-cwt. beast yielding 56 per cent. If the farmer sells on the dead-weight basis, he gets this full 1*s.* 2¼*d.* per lb., or, in other words, he gets the same return as if he had sold the same beast on the live-weight basis. If an increased price is paid for offals it would therefore be equitable to pay a less price for the meat, otherwise the farmer would secure more for a beast on the dead-weight basis than he would by selling the same beast on its live weight.

AN Order (No. 1308), dated the 14th October, 1918, has been made by the Food Controller to the effect that :—

The Cattle Feeding Stuffs (Distribution) Order, 1918.

1. *Restriction on Supplying or Obtaining Cattle Feeding Stuffs.*—A person shall not on or after the 17th November, 1918, obtain or attempt to obtain cattle feeding stuffs from any person or supply or attempt to supply any cattle feeding stuffs to any person except under and in accordance with the provisions of this Order.

2. *Power to Sell to Holders of Certificates.*—A person named as a supplier, in a certificate granted under this Order, may supply to the person therein named or referred to as the buyer, cattle feeding stuffs of the class or classes and up to the quantity and subject to the conditions mentioned in, or applicable under such certificate

3. *Power to Holders of Certificates to Buy.*—A person named or referred to as a buyer in a certificate granted under this Order may obtain from the person named therein as the supplier, cattle feeding stuffs of the class or classes and up to the quantity and subject to the conditions mentioned in or applicable under such certificate.

4. *Cattle Feeding Stuffs to be Used in Accordance with Certificate.*—A person shall not use or permit to be used any cattle feeding stuffs obtained under a certificate granted under this Order except in accordance with the terms and conditions mentioned in or applicable under such certificate.

5. *Producers, Makers or Dealers not to Use Cattle Feeding Stuffs to Feed to Live Stock.*—(*a*) A producer or maker of or a dealer in cattle feeding stuffs shall not on or after the 17th November, 1918 (except under and in accordance with the provisions of this Order or of any directions given thereunder), use any cattle feeding stuffs produced, acquired or obtained by him in the course of his occupation, trade or business for the purpose of feeding his live stock.

(*b*) Nothing in this Clause shall prevent :—

(i.) A person who has made an application for a certificate under this Order from using for the purpose of feeding to his live stock any cattle feeding stuffs mentioned in such application as being in hand at the date thereof ; or

(ii.) A person from using for the purpose of feeding his live stock any cattle feeding stuffs which he might lawfully have obtained and fed to such live stock otherwise than under a certificate.

6. *Power to Food Controller to Grant Certificates.*—The Food Controller or any person authorised by him may grant certificates under this Order on such terms and conditions as he may from time to time determine and may revoke any certificate, and may from time to time by general or special notice vary the quantity or class of cattle feeding stuffs obtainable under any certificate or any class of certificate.

7. *Grading of Certificates.*—(*a*) Certificates granted under this Order may be graded by or under the authority of the Food Controller so as to give priority to any class of live stock over any other class of live stock, and for this purpose any class of live stock may be subdivided.

(*b*) Where certificates have been graded, a person shall in the disposition of any cattle feeding stuffs held by him have regard to the grades of the certificates upon which he is named as supplier, and shall not dispose of any cattle feeding stuffs to the holder of a certificate of a lower grade until all orders for cattle feeding stuffs properly demanded upon a certificate of a higher grade have been filled by him.

8. *Application for Certificates.*—Every application for a certificate shall be made in such a manner or on such form as may from time to time be prescribed by or under the authority of the Food Controller.

9. *Power to Food Controller to Give Directions.*—(*a*) Directions may from time to time be given by or under the authority of the Food Controller relating to—

(i.) Records to be kept and returns to be made by any person who deals in cattle feeding stuffs or who has obtained any cattle feeding stuffs upon a certificate granted under this Order.

(ii.) The endorsement on certificates of particulars of the class and quantity of cattle feeding stuffs supplied thereon, and

(iii.) Any other matter in connection with the trade or business of any person dealing in cattle feeding stuffs.

(*b*) All persons concerned shall comply with any directions given by or under the authority of the Food Controller, and shall permit any person authorised by the Food Controller to inspect any records directed to be kept under this Clause.

10. *Saving Clause in Case of Maize, Maize Products and Poultry Mixtures.*—(*a*) Nothing in this Order shall prevent the sale and purchase without a certificate of maize or maize products (other than gluten feed, Paisley meal, maize germ meal and hominy chop) or of any horse mixture where the purchaser declares that he is buying for the purpose of feeding the same to any stallion used exclusively for stud purposes, or to any horse to which the Horses (Rationing) Order, 1918,* or any other Order made by the Food Controller restricting the amount of cereal foodstuffs to be fed to horses applies; provided that the purchaser shall use the same for the purpose of feeding a horse or horses of the classes specified above.

(*b*) Nothing in this Order shall prevent the sale and purchase without a certificate of any poultry mixture where the purchaser declares that he is buying for the purpose of feeding the same to any poultry, provided that the purchaser shall use the same for the purpose of

(*c*) The Food Controller may at any time by notice under this Order direct that any declaration to be made for the purpose of either of the foregoing Sub-clauses of this Clause shall be made in writing.

11. *Provisions of Horses (Rationing) Order, 1918, to be Observed.*—Nothing in this Order shall be taken to authorise any cereal foodstuffs to be fed to horses in contravention of the provisions of the Horses (Rationing) Order, 1918, or any other Order of the Food Controller restricting the amount of cereal foodstuffs to be fed to horses.

12. *False Statements.*—A person shall not—

(*a*) make or connive at the making of any false statement on any application or return made in connection with or for any of the purposes of this Order, or make or connive at the making of any false statement for the purpose of obtaining any cattle feeding stuffs, or obtain or attempt to obtain any cattle feeding stuffs, where any false statement has been made on the relative application; or

(*b*) without lawful authority alter or attempt to alter or forge any entry upon a certificate; or

(*c*) make or connive at the making of any false entry or endorsement on a certificate; or

(*d*) fail, neglect or connive at any failure or neglect to make any entry or endorsement on any certificate in manner directed thereon or required under this Order; or

(*e*) assign or attempt to assign any certificate or any cattle feeding stuffs obtained thereunder; or

(*f*) falsely represent himself to be a person to whom any such certificate applies or has been issued.

13. *Interpretation.*—For the purposes of this Order—

The expression "horse" shall include mare, gelding, filly, pony, ass and mule.

The expression "cattle feeding stuffs" shall mean oil cakes and meals and other cattle feeding cakes and cattle feeding meals of every variety, millers' offals, millers' screenings, barley offals, oat offals, malt culms, brewers' grains, distillers' grains, maize, gluten feed, Paisley meal, maize germ meal, hominy chop and other maize products, molassed foods and mixtures containing any of the foregoing articles, but does not include dog biscuits or any of the foregoing articles which are suitable for human food.

14. *Exception.*—This Order shall not apply to—

(*a*) the making or obtaining of a supply of cattle feeding stuffs proved to have been made to a person buying for the purpose of re-sale pursuant to this Order; or

(*b*) the making or obtaining of a supply of cattle feeding stuffs for the purpose of being fed to any horse owned by the Admiralty, Army Council or Air Council.

(*c*) Sales of cattle feeding stuffs in quantities not exceeding 7 lb. in one week to or for the benefit of any person, except in so far as the Food Controller may direct that it shall apply; or

(*d*) Dealings in cattle feeding stuffs in Ireland for del

15. *Revocation. S. R. & O. No. 7 of* 1918.—The Cattle Feeding Stuffs (Priority Supply) Order, 1918,* is hereby revoked as at the 17th November, 1918, without prejudice to any proceedings in respect of any infringement thereof.

Feeding Stuffs: Question in Parliament.

Mr. Wright asked the Food Controller whether he is aware of the general sense of dissatisfaction amongst home-producers of meat and milk at their failure to obtain supplies of concentrated feeding stuffs; and if he will state the reasons why these feeding stuffs cannot be obtained?

Mr. Clynes: A certain degree of dissatisfaction is inevitable, but it should be realised that the shortage of concentrated feeding stuffs is due to the paramount requirements of the American military programme. Tonnage which would have been otherwise available for feeding stuffs has, by the decision of the Government, been allocated to the transport of American troops. So far as the President of the Board of Agriculture and myself are concerned, we could only accept this decision, which clearly tends towards shortening the War, and do everything in our power to remedy the difficulties with which the farmers were bound to be faced. We forthwith arranged a scheme for the equitable distribution of such feeding stuffs as were available, and with a view to encouraging the farmers to hold back their cattle at the present time, we propose to increase the prices for cattle and sheep as from December.

Wheat, Barley and Oats: Question in Parliament.

General Sir Ivor Philipps asked the President of the Board of Agriculture what is the approximate average price per 100 lb. which a farmer receives for wheat, barley and oats fit for human consumption delivered at corn-dealers' stores; what is the approximate average price per 100 lb. a farmer receives for wheat, barley and oats which is damaged and not fit for human consumption; what is the approximate average price a farmer has to pay for barley meal or compound prepared meals for cattle and pig feeding; and what is the approximate average cost to a farmer of hauling the above from farm to market per 100 lb. per mile?

The Parliamentary Secretary to the Ministry of Food (Major Astor): I have been asked to reply. The approximate average price per 100 lb. of home-grown wheat, barley and oats fit for human consumption delivered by the farmer to dealers' stores, in accordance with the custom of the district, is 15*s*. In case of delivery outside the accustomed range an additional charge of 9*d*. per ton per mile may be made for the extra distance. The approximate average price per 100 lb. of these articles when unfit for human consumption is 13*s*. 9*d*. The price of compound meals for cattle is controlled under Clause 1 (*c*) of the Cattle Feeding Stuffs (Maximum Prices) Order, 1918,† which prescribes that a manufacturer may only charge the actual cost of the ingredients used plus the cost of manufacture and profit, such addition not to exceed 30*s*. per ton. On this basis the maximum price for dairy meals ranged from £16 17*s*. 6*d*. to £17 5*s*. per ton according to the proportion of oil and albuminoids employed. The fourth part of the question

* Printed in this *Journal*, February, 1918, p. 1207.

what hypothetical character. I may add that a new Cereal Meals Order is in preparation which should control more effectively the quality and price of cereal meals.

THE following Press Notice was issued by the Board towards the end of October :—

Shortage of Feeding Stuffs: Advice to Pig Keepers.*

Since the Board of Agriculture in the spring urged both farmers and cottagers to keep pigs and encouraged the formation of pig clubs in urban districts where household waste could be collected the situation has changed greatly for the worse.

Even at that time the Board felt it necessary to confine their encouragement to pig keepers who could provide the greater part of the food required either from household waste, garden produce, roots, vetches or other green crops of the farm.

Despite the increasing difficulties that were experienced in obtaining even a small allowance of concentrated feeding stuffs, a difficulty caused by the growing shortage of supplies, a large number of people throughout the country responded to the invitation of the Board and effected a substantial increase in the number of pigs.

It has now, however, become necessary to tell pig keepers that even the small allowance of concentrated food hitherto allotted to pigs may not be continued beyond 25th January, 1919.

Every possible ton of shipping space has to be spared to bring American soldiers and their supplies. To this broad decision of policy to force the War to an early and successful issue the Board of *Agriculture must conform, much as it may deplore the difficulties it* imposes upon owners of livestock. The result is that the small supply of feeding stuffs available must be strictly rationed, and the amount coming forward is only sufficient to supply the milch cows and calves, sows and pigs with a limited allowance. Even that allowance will soon begin to outrun the supply and pigs may have to be withdrawn from the favoured list after 25th January

What is the pig keeper to do ?

The farmer has to command a certain quantity of home-grown food ; he may be able to spare some roots, he may have chat or damaged potatoes. With these and a small daily allowance of tail or damaged grain he can keep his pigs growing without even the allowance of offals to which he is entitled until January. No man ought to feed pigs on meal alone.

Pig clubs can still command the waste that is being collected; with that and the allowance of offals they can still obtain they will be able to maintain their pigs until January. They must use their own judgment as to whether they can keep them any longer, or whether they must kill off some before that date in order to have food enough for the rest. Many cases are reported to the Board where pigs are being kept successfully on waste alone, and this is possible where the pigs are not too young. The cottager is, perhaps, in the worst case. He must do the best he can under his own circumstances. Up to January he can still buy offals, he has his small and damaged potatoes and a certain amount of waste and garden produce. He must get the pig on as far as he can with that and at the worst kill it before the supply gives out.

The Board are being constantly asked whether they want pigs kept. They [illegible] ood

beyond January, and they, therefore, cannot advise anyone to continue to keep pigs who does not see some way of providing for them out of local resources. The price of pork and bacon is high and is not likely to fall, there will be a great demand for young pigs as soon as food becomes available again. These are the plain facts: the Board want pigs and believe in pig production, but cannot obtain any food for them from the outside. But they urge every pig keeper to make the best shift he can.

THE following Press Notice was issued by the Ministry of Food on 5th November :—

Slaughter of Pigs.

As there seems to be considerable misunderstanding with regard to the attitude of the Ministry of Food on the subject of the killing of pigs, the Food Controller announces that there is no Order or instruction to the effect that pigs must be killed before Christmas or any other date. The misunderstanding appears to have arisen from the announcement that the Ministry could not guarantee that supplies of imported feeding-stuffs would be available for store pigs after Christmas. The reason for this was that the Government decided that, in view of the military situation, it was imperative to bring over as many American soldiers as possible to relieve the armies in the field, and, consequently, the imports of feeding-stuffs which had been arranged by the Ministry had to be drastically reduced. Meantime the National Salvage Council, on which the Ministry of Food is represented, is taking all possible steps to encourage the collection and utilisation of house and garden refuse for purposes of providing food for pigs.

Owing to the large supplies of home-killed beef and mutton at present available, it is not desired that pigs should be slaughtered if they can be fed. It has, however, been decided by the Food Controller to remove the restriction on the slaughter of pigs weighing less than 112 lb. live weight at the time of slaughter. Such pigs may be slaughtered on the farm or elsewhere with the consent of the Area Live Stock Commissioner. Self-suppliers do not, however, require such consent. The carcasses or carcasses and offals of such pigs, if intended for sale, must be sent to the Government authorised slaughter-house or bacon factory notified by the Live Stock Commissioner, where they will be bought and paid for at the controlled dead-weight prices if received in good condition, and distributed to butchers for sale against the ration or utilised in the bacon factory as the case may be.

Sale of Cottagers' Pigs.

THE new Pig (Sales) Order* and the instructions issued under it, provide a simple method for the disposal of the cottager's pig. He obtains a special postcard at any post office addressed to the Live Stock Commissioner for his area, notifying the fact that he has a pig for sale. Arrangements are then made to deal with the matter. Small owners should bear in mind that facilities cannot be given to any one man for sale, otherwise than through a market, of more than three pigs in one calendar year. (*National Food Journal*, 23rd October, 1918.)

* Printed in this *Journal*, October, 1918, p. 883.

THE following Notice, prepared in agreement with the Ministry of Food, was issued by the Board of Agriculture and Fisheries on 21st October, for the information of farmers:—

Damaged Grain: Notice to Farmers.*

1. Farmers possessing tail corn (wheat, rye, barley or dredge corn) or corn which, after threshing, they consider unfit for use as human food, must submit a sample to the Grain Officer of the district.

2. If the Grain Officer accepts the sample as unfit for human food he will grant a licence to the owner enabling him to use the corn for feeding live stock subject to any restrictions imposed by the Horses Rationing Order† and other Orders issued by the Ministry of Food, and will advise the Live Stock Commissioner.

3. Any licence granted will incorporate a certificate entitling the farmer to sell in quantities of 10 cwt. or less at a time, but no certificate is required for the sale of larger quantities.

4. No farmer is compelled to sell tail or damaged corn passed by the Grain Officer, but if he does sell he may not accept more than a fixed maximum price for damaged grain, that is 7*s.* per qr. less than the price for undamaged grain.

5. A farmer who cannot obtain a licence to feed grain as tail or damaged corn is not compelled to sell at any price below the maximum. If he finds any difficulty in selling he should apply to the Grain Officer, who will obtain for him at the earliest opportunity the maximum price.

6. Farmers having badly-sprouted crops are recommended to stack separately, and in respect of such portion as is considered to be incapable of being threshed, should apply to the Grain Officer for a licence to feed, which may be granted or refused after inspection.

7. As regards crops which are badly sprouted or badly laid in the field, the Grain Officer, after inspection may grant a licence for feeding the whole or portion of the field, or where the grain has been cut may instruct the farmer to stack any portion of the sheaves separately for threshing, afterwards giving him a licence to deal with the rest for feeding.

8. This notice does not apply to oats. A farmer may feed a reasonable quantity of oats in the straw subject to any conditions imposed by Orders issued by the Ministry of Food or Army Council, but may not sell such oats except to the Army authorities.

9. Farmers are urged to hold their out-of-condition grain as long as possible in the stack so that it may become mature, and the maximum quantity thereby retained for human food.

THE Food Controller, by an Order (No. 1309), dated 14th October, 1918, has made the following amendment to the Dredge Corn Order, 1917‡:—

Order Amending the Dredge Corn Order, 1917.

In Clause 2 (*a*) of the Principal Order, the words "the Grain (Prices) Order, 1918," shall be substituted for the words "the Grain (Prices) Order, 1917."

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* See also The Cereals (Restriction) Order, 1918, printed in this *Journal*, September, 1918, p. 745.

‡ See next page.

Regulation of the Sale and Use of Unthreshed Oats in Great Britain.

AN Order has been issued by the Army Council providing that:—

1. Producers having in their possession unthreshed oats grown by them may use a reasonable quantity as feed for their own stock.

2. Farmers desirous of purchasing unthreshed oats must make application to the District Purchasing Officers for Supplies* of the county or district concerned for a licence to do so, stating the name and address of the producer from whom they desire to purchase the same and the quantity required. Such unthreshed oats must not be used for any purpose other than the consumption by stock in the purchaser's possession, and must not be re-sold.

3. *The above are the only instances where the consumption of* unthreshed oats is permissible, outside possible Army requirements.

The Horses (Rationing) No. 2 Order, 1918.

AN Order (No. 1331), dated 17th October, 1918, has been made by the Food Controller to the effect that:—

1. No person shall feed any horse or permit any horse to be fed with cereal foodstuffs except as provided in this Order, or under the authority of the Food Controller.

2. This Order shall not apply to horses falling within the classes mentioned in the First Schedule.

3. Horses falling within the classes mentioned in the Second and Third Schedules may not on any day be fed with more than the quantity of cereal foodstuffs prescribed for such horses in the Schedules, or in such other Schedules as may from time to time be prescribed by the Food Controller for the purposes of this Order.

4. The maximum quantity of cereal foodstuffs which may be fed on any one day is prescribed in the Schedules in terms of oats, but other cereal foodstuffs may be used in lieu of oats, and if so used they shall be deemed for the purpose of this Order to be the equivalent of oats in the following proportions:—

7½ lb. maize = 10 lb. oats.
9 „ beans = 10 lb. oats.
9 „ peas = 10 lb. oats.
12 „ brewer's grains = 10 lb. oats.
13 „ bran or other miller's offals = 10 lb. oats.
12 „ any horse mixture not containing hay or straw chaff = 10 lb. oats.
10 „ any other cereal foodstuffs which may lawfully be fed to a horse = 10 lb. oats.

The allowance for brewer's grains is for dry grains—4 lb. of brewer's grains obtained wet may be used in lieu of 1 lb. of dry brewer's grains.

5. Horses falling within the classes mentioned in the Fourth Schedule may not be fed with any cereal foodstuffs.

6. Any person or persons in possession of a horse or horses to which this Order applies shall keep a record in writing in sufficient detail to show (1) the number of horses kept by him in each class referred to in Schedules II and III, (2) the total maximum rations authorised by this

* A list of the addresses of these officers was published in

Order, (3) the description and quantities of the cereal foodstuffs fed to such horses per week, and (4) the description and quantities of all cereal foodstuffs purchased and the date of such purchase ; such records shall at all reasonable times be open to inspection by an officer or constable of police or any person authorised by the Food Controller, or the Controller of Horse Transport.

7. For the purpose of this Order :—

"Horse" shall include mare, gelding, colt, filly, pony, mule, and ass

"Cereal foodstuffs" shall include all grains, and beans and peas, and products thereof, and mixtures containing any such articles.

8. The Horses (Rationing) Order, 1918,* is hereby revoked as at the 21st October, 1918, without prejudice to any proceedings in respect of any contravention thereof or to any exemptions granted thereunder.

This Order came into force on the 21st October, 1918.

NOTE.—The amount of hay which may be fed to horses in Great Britain is restricted by an Order of the Board of Trade called the Hay and Straw Order No. 3, 1918 (S.R. & O. No. 1216) of 1918).† No restriction is placed by this Order or by the Board of Trade Order on the use for feeding purposes of straw or roots.

Schedule I.

Horses excluded from the operation of this Order :—

(*a*) Horses owned by the Admiralty, the Army Council or the Air Council.

(*b*) *Horses maintained and used exclusively for agricultural purposes.*

(*c*) Stallions used exclusively for stud purposes.

Sechdule II

Horses solely or mainly used for trade or business purposes to be rationed :—

Class of Horse.	Maximum Daily Ration in Terms of Oats.	
	When in Hard and Continuous Work.	When not in Hard and Continuous Work.
	lb.	lb.
(*a*) Heavy dray and cart horses and heavy trotting vanners	16	12
(*b*) Light dray and cart horses and light trotting vanners	14	10
(*c*) Other light horses and cobs	12	9
(*d*) Ponies 14 hands and under	7	5

Notes.

(1) The jobbing out of horses is not in itself a trade or business purpose within the meaning of this Order.

(2) Pit ponies, working in the pits or at the pit mouth, may be given 4 lb. extra per day.

(3) Pit horses, working in the pits or at the pit mouth, may be given 2 lb. extra per day.

(4) Horses regularly engaged in work at a slow pace, not involving heavy loads and allowing of frequent intervals of standing, should be regarded as not in hard and continuous work.

* Printed in this *Journal*, May, 1918, p. 231.
† Printed in this *Journal*, October, 1918, p. 891.

Schedule III.

Horses not used for trade or business purposes to be rationed :—

Class of Horse.	Maximum Daily Ration in Terms of Oats.
(*a*) Brood Mares	7 lb.
(*b*) Weaned Foals	6 „
(*c*) Yearlings :—	
1st January to 31st May	6 „
1st June to 31st August	3 „
1st September to 31st December	6 „
(*d*) Two and three year olds :—	
1st January to 30th April	7 „
1st May to 31st October	3 „
1st November to 31st December	7 „
(*e*) Entire thoroughbreds, two years old and upwards, not used for stud purposes	7 „
(*f*) Hunters, not less than 14.3 hands, between the ages of 4 and 12 years (both inclusive), regularly hunted, sound, and suitable for military service as (*a*) officers' chargers, (*b*) cavalry troop horses, or (*c*) artillery riding horses; such horses being the property of (1) the master or committee of a recognised pack of hounds, or of (2) recognised followers living within the limits of the hunt. The horses to be registered by the master or his authorised deputy, who shall notify the owners of the horses and the Controller of Horse Transport, 7, Whitehall Gardens, S.W. 1, of such registration. Horses so registered are liable to be called up by the Army Remount Department at any moment.	6 lb. from 1st Oct. to 31st Oct.; 10 lb. from 1st Nov. till end of season.
(*g*) Racehorses registered with the Controller of Horse Transport, 7, Whitehall Gardens, S.W. 1, for the purposes of the limited racing scheme	13 lb.

Note.—The age of a horse is to be reckoned as beginning on the 1st January of the year in which the horse was foaled.

Schedule IV.

Horses not to receive any cereal foodstuffs :—

Horses not falling within any of the classes mentioned in Schedules I., II., III., including :—

(*a*) Racehorses, hunters and thoroughbreds, other than those specified in Schedules I. and III.

(*b*) Carriage horses, hacks, char-à-banc horses, polo ponies, including all horses let out on hire for these purposes, and horses used in entertainments.

(*c*) Horses mainly used for other than business or trade purposes including all horses let out on hire for other than these purposes.

Note.—Correspondence with respect to this Order should be addressed to the Controller of Horse Transport, 7, Whitehall Gardens, S.W.1.

THE following Notice was issued by the Food Production Department of the Board on 18th October :—

Horse Chestnuts as Food for Stock.*

Horse chestnuts may be profitably utilised as food for farm stock. They are similar in composition to acorns but are appreciably richer in carbohydrates. While some classes of stock will eat them in the raw state, the bitter principles and other ingredients which they contain cause them, unless specially treated, to be

* A note on Horse Chestnuts as Fodder was printed in this *Journal*, July, 1918, p. 451. See also this *Journal*, September, 1914, p. 511, an article on "The Value of Acorns, Horse Chestnuts and Beech Mast as Food for Stock."

refused by some animals. In this fresh state they are poisonous to fowls, ducks, and geese.

In the fresh condition, however, they are well suited for sheep and goats, to whom the bitter principles referred to would appear to be actually beneficial. To sheep they may be fed crushed in quantities of 1 lb. per head per day, well mixed with chop or green food. Ewes with lambs should not be given more than ½ lb. per day.

Cattle will also readily take the crushed fresh nuts, but they *must* be crushed; and as much as 20 lb. per head per day has been fed to fattening cattle, although 12 lb is more usual and a safer ration. Accounts differ as to the use of fresh chestnuts for dairy cattle, but they are on the whole not recommended.

Horses, if they can be induced to eat chestnuts in the fresh crushed state, may take them up to 6 lb. per head per day.

In all cases it is desirable to correct the binding tendency of the chestnuts by a liberal use of green food or other laxative material, such as roots or silage, to which chestnuts have proved a very satisfactory supplement. The use of salt also corrects their binding effect. Provided that this effect be prevented, it is claimed that chestnuts exercise a beneficial influence medicinally. They should also be of value for feeding together with oil-cakes rich in protein.

Pigs will not take fresh horse chestnuts, but will take them in the form of meal mixed with other foods up to 1½ lb. per head per day.

Chestnuts should be allowed to fall before being harvested.

To prepare the meal the nuts should be dried by spreading out in a thin layer and occasionally turning. The drying should be completed (if possible, but not necessarily) in a hop oast or similar appliance in which the temperature can be raised to 160° F. They should then be husked and roughly crushed, soaked for 24 hours in one or two waters, or in a running water, and then boiled for about half-an-hour. The water should then be drained off and the residue dried and reduced to a meal, which in feeding value will be roughly equivalent to barley or maize.

Wherever practicable, and especially where it is desired to feed large quantities of chestnuts, it is desirable for all classes of stock that such a meal should be prepared.

Mouldy chestnuts or meal made from mouldy chestnuts should, of course, never be fed.

Potash: Question in Parliament.

Mr. Wright asked the President of the Board of Agriculture whether, in view of our dependence hitherto upon the German Empire for the supplies of potash necessary for good cultivation, any and what steps have been taken by the Government to ascertain if potash can successfully be recovered on a commercial scale as a by-product from the manufacture of cement and pig-iron?

Mr. Kellaway: A scheme for recovering potash on a commercial scale from the blast furnaces used in the manufacture of pig-iron was approved last year. In consequence the Ministry has encouraged the installation at various iron works of gas-cleaning plant designed to extract from the furnace gases potash-bearing dust. Certain of these plants are now in operation, others are under erection, while others, again, are in course of construction. A factory has also been erected

at which muriate of potash, free from deleterious impurities, is being manufactured from such dust. This factory is capable of dealing with all the dust that can be collected by the gas-cleaning plants now under erection and construction. As other gas-cleaning plants are installed it is proposed to erect other factories in suitable localities. A small amount of potash is also being obtained as a by-product of the cement industry, and experiments are, at the present time, being carried on with a view largely to increase the amount so recovered.

Order Amending the Butter Order, 1918.

AN Order (No. 1334), dated 18th October, 1918, has been made by the Food Controller to the effect that :—

1. (*a*) In clauses 3 and 4 of the Principal Order* the words "2*s*. 3½*d*. per lb." shall be substituted for the words "2*s*. 1½*d*. per lb." and the words "2*s*. 3*d*. per lb." shall be substituted for the words "2*s*. 1*d*. per lb."

(*b*) In clause 6 of the Principal Order the words "2*s*. 6*d*. per lb." shall be substituted for the words "2*s*. 4*d*. per lb."

2. The Notice dated 16th September, 1918,† prescribing certain prices for Government butter shall cease to have effect as from the 20th October, 1918.

A Disease of Rabbits.

EARLY in October a number of newspapers published on the authority of a Surrey correspondent a statement to the effect that "thousands of rabbits" were dying in Surrey and other ounties from "a mysterious disease." In some quarters it was suggested that the disease was "fluke"; in others that it was "a new disease."

It is perfectly true that a certain number of deaths has been reported by rabbit-keepers in different parts of the country; possibly the total of such deaths may have run into "thousands," although no precise figures are available on this point. In relation to the number of rabbits that are now being kept, and on the whole kept successfully in this country, however, the losses reported are negligible.

It is estimated that at present there are at least ten times as many tame rabbits in England and Wales as there were twelve months ago. It is only to be expected that, since the majority of these rabbits are owned by persons who had never reared a rabbit before the national rabbit-keeping propaganda started, and since have experienced a rather unfavourable season and difficulty in obtaining good hay in many places, there should be a percentage of deaths. It is very significant, however, that whilst many novices, including school children, soldiers at the Front, inexperienced women and others, have written to the National Utility Rabbit Association (124, Victoria Street, S.W. 1) telling of their success as breeders or rearers of rabbits, no serious loss has been notified by any beginner who has followed the instructions given in Leaflet No. 265, a copy of which may be obtained free of charge on application to the Board of Agriculture, 3, St. James's Square, London, S.W. 1.

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* Order No. 976 of 1918. Printed in this *Journal*, September, 1918 p. 750.

† Order No. 1164 of 1918. This Order has not been published in this

The disease from which the rabbits referred to in the Surrey report apparently died is neither new nor mysterious. It is called Coccidiosis. Young animals are particularly liable to this disease, which affects the liver. There is no known cure, and animals suffering from a bad attack should be killed and burnt. The parasite of the disease is extruded from the bowels of an affected animal; at first it is not infectious, but it becomes so in a few days.

The *preventive measures* advised are (1) special cleanliness—the hutch being cleaned out, if possible, every day and any contaminated bedding removed; (2) care in feeding—so that the rabbits eat no contaminated matter; and (3) the supply of twigs for the animals to nibble. It may be explained that practically all rabbits harbour the parasite of the disease, but it is only through repeated infection from the consumption of foul matter that "the disease stage" is reached.

It is suggested that the danger of bowel or liver trouble in rabbits may be minimised by an avoidance of the feeding of wet, frosted, or stale greenstuff. If weeds or vegetable waste are wet when gathered they should be dried by being laid out thinly before feeding; if dirty, these and roots which form the bulk of the winter food, should be cleaned before feeding.

Broadly speaking, a 6-lb. rabbit should have 2 oz. of hay and 10 oz. of green food or roots per day. The authorised ration for a rabbit is 1 lb. of hay per week. This can be obtained from any licensed dealer in hay by anyone who has registered as a rabbit-keeper.

THE following Notice was issued by the Food Production Department of the Board on 18th October:—

The National Rabbit Scheme Interesting *Developments.*

The National Rabbit Breeding Scheme has been taken up by nearly every county in England and Wales; and in some counties as many as ten breeding centres have been formed. Since the formation of the National Utility Rabbit Association a considerable amount of spade work has been done especially in proving to the general public that tame rabbits do not taste "hutchy"; are in fact the same as the "Ostend Rabbit," and in convincing breeders that rabbits can thrive on food other than corn, oats, middlings, and bran. Before the opening of the doe-centres in different parts of the country the Association managed to put upwards of 3,000 would-be purchasers and sellers in touch with one another. Advice has been given continually as to the best methods of breeding, the diseases of rabbits, and their care, the best methods of forming clubs, etc. The Association has also arranged with the Food Production Department to approach the Ministry of Food with a view to securing sufficient rabbit food for the winter for members affiliated to the Association. The big depot at Neasden has now been stocked with hutches and rabbits, and demonstrations will shortly be held there showing how to kill and skin rabbits.

One hundred and fifty-six doe-centres have been formed in different parts of England and Wales; and a scheme has been organised which will enable members of the National Utility Rabbit Association to purchase from their nearest centre rabbits for stud purposes, to hire stud bucks, to obtain material for hutches, certain foods, advice, etc. Through these centres members will also be able to dispose of their

surplus stock and rabbit skins. Certain days have been fixed for killing paunching and skinning rabbits; the rabbits and skins will then be packed and despatched to markets.

Promises have been obtained from furriers to take all skins at higher prices than have usually been obtained by rabbit-keepers. The question of dyeing the skins for furs is receiving attention.

THE following Notice was issued by the Food Production Department of the Board on 11th October :—

Tame and Wild Rabbit Prices.

The Food Production Department has been in communication with the Ministry of Food regarding the question of the price of tame rabbits; and it has been decided that for the present the price of these should not be fixed. A large number of people apparently believe that the Order fixing the price of wild rabbits applies also to tame rabbits This is not the case. The *Ministry of Food has not fixed the price for tame rabbits.*

It would certainly not be fair to a breeder if he has to sell his tame rabbits at the same price as the rabbit catcher sells wild rabbits. Moreover, the flesh of the well-kept tame rabbit is superior in taste to that of the wild rabbit.

THE following Notice was issued by the Food Production Department of the Board on 25th October :—

The Rat Evil.

During the past eighteen months the Food Production Department has been encouraging the formation of Rat Clubs and in other ways endeavouring to combat the damage caused by rats to cereals in store. The Ministry of Food has now issued the Rats Order, 1918,* wherein local authorities charged with the administration of the Order are instructed to give due regard to any recommendations of the Board of Agriculture or a local War Agricultural Executive Committee. In view of the enormous amount of damage done by rats, the Food Production Department asks Executive Committees to call the attention of the local authorities to any cases in which action should be taken under the Order; and in all possible ways to co-operate with these authorities in making the Order effective.

THE following Notice was issued by the Food Production Department of the Board on 25th October :—

Birds and Grain: Official Advice on Dressing.

The usual dressings used to protect seeds corn from birds are made from tar. The different kinds of tar vary in usefulness and the Food Production Department have recently had tests of different tar dressings made at Rothamsted. No dressing tested gives absolute protection; most of them injure the seed unless carefully used. But when wheat is sown late in the autumn or grain is sown early in spring, rooks and other birds may cause so much damage that seed should be dressed.

* Printed in this *Journal*, September, 1918, p. 761.

The best form of tar that has been tested is *acetone tar*. This is only supplied by the Ministry of Munitions (Propellants Branch, 32, Old Queen Street, London, S.W. 1), and in quantities of not less than one barrel (40 gal.). It is produced in Essex, and in the Forest of Dean, Gloucestershire; and the current price is about 80*s*. per barrel at the works. To secure this product farmers who do not require a 40-gal. cask should combine and secure delivery of a barrel through a dealer. The method of treatment is to sprinkle 1 pt. of tar on 4 bush. of grain, and to turn the seed over and over until the tar is uniformly distributed. If spread out the seed should dry in a day. If the tar is too thick for handling (as it is in very cold weather), it must be warmed before use. This may be done by standing the vessel containing the tar in hot water.

Ordinary coal tar is often used for dressing seed; but it is rather variable in nature. It is not so protective nor so safe to use as acetone tar. If, however, the coal tar usually met with is used as follows, the risk of injury to seed is slight. One pint thinned down with one-quarter to one-third its volume of paraffin and stirred well may be applied to 6 bush. of grain in the same way as acetone tar. Great care must be taken to obtain an even distribution of the tar, otherwise it will have a harmful effect on the grain. This may be dried off with lime.

In dressing seed by either of the above methods, the most important point to remember is that the mixing should be thoroughly carried out, and the mixture be used as directed. The material will then have little or no adverse effect on the germination of the grain.

Bee Food: Question in Parliament.

Mr. Maurice Healy asked the Food Controller on 29th October whether he had received a resolution from the Committee of the Cork City and County Bee-keepers' Association claiming that bee-keepers should receive the same facilities for the purchase of sugar as is given to the fruit growers, and whether he is prepared to accede to this request?

Mr. Clynes: The resolution referred to in this question has been received by the Food Controller. Arrangements have been made to increase the supplies of bee candy, and a system of rationing the supplies of bee food to bee-keepers is in contemplation. It is not considered advisable to issue for use as bee food sugar which is suitable for domestic consumption.

Anti-Abortive Vaccine: Question in Parliament.

Mr. Wright asked the President of the Board of Agriculture on 29th October whether a cow or heifer injected with the Board's anti-abortive vaccine, which is supplied free to farmers who apply for it, remains a carrier of the germ of epizootic abortion, though immune herself, and liable to infect other animals; and, if so, for how long?

The President of the Board of Agriculture (*Mr. Prothero*): The reply to the first part of the question is in the negative. The second does not, therefore, arise.

Foot-and-Mouth Disease.

No further cases of Foot-and-Mouth Disease have occurred in East Sussex or elsewhere since those recorded in the *Journal* for last month. The restrictions on the movement of animals which were imposed by the Board in consequence of those cases were gradually modified and were finally revoked by an Order of the Board which came into operation on the 11th November.

Rabies.

SINCE the Notices which appeared in last month's *Journal* respecting cases of Rabies in Devonshire, the number of outbreaks has unfortunately continued to increase almost daily, the total number of animals in which the disease has been confirmed now standing at 71, whilst there are still 39 suspected cases under investigation. The majority of the cases have occurred in Plymouth and the immediate vicinity, but there have also been disease centres at Modbury, Ivybridge, and Tavistock in Devon, and at Fowey, Launceston, Wadebridge, Bodmin, St. Mellion, Probus and Penzance, in Cornwall. In the Launceston case the dog had travelled from Okehampton, a distance of some 15 miles.

Owing to the length of time that Rabies was in existence in Cornwall and Devon before it was reported to the Board, there is still a grave risk that the disease has been carried to other parts of the country, although no cases have yet been confirmed outside the two counties mentioned. The appeal twice made by the President to persons who had visited Devon and Cornwall during the summer months accompanied by dogs to notify the Board and to place their dogs under detention on veterinary premises, has met with a response in 29 instances only. As there must have been many more, it is hoped that the owners will in the interests of the public as well as in their own interest follow the course advised. Human life is at stake. At least 22 persons are known to have been bitten, 9 being children, and all of these have been sent to Paris for treatment at the Pasteur Institute.

As regards the measures taken by the Board to prevent the further spread of the disease, the whole of Devon and Cornwall is now subject to muzzling regulations, and no dog can be moved out of those counties except with a licence of the Board and subject to the condition that the dog must be detained and isolated on approved veterinary premises for four months.

Annual Report of the Chief Veterinary Officer of the Board for 1917.

AN abridged Annual Report of the Chief Veterinary Officer of the Board for 1917 has just been issued. Copies may be obtained from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 2*d.* net, excluding postage.

The Report deals with the outbreaks of swine fever, glanders, anthrax, sheep scab and parasitic mange during 1917. The number of suspected outbreaks of *Swine Fever* reported was 10,261, and the

number confirmed by combined inquiry in the field and at the Board's laboratory was 2,104. This is a decrease of 2,227 as compared with 1916. Twenty-five outbreaks of *Glanders* among civilian horses are reported, which shows a decrease of 19 as compared with 1916. In regard to *Anthrax*, reports were received in relation to 2,229 suspected outbreaks, of which 423 were confirmed by tests for diagnosis at the Board's laboratory—201 in England and 222 in Scotland. Notification of *Sheep Scab* was received in 604 cases, occurring in premises which were declared infested places by service of separate detention notices. Disease occurred in 34 counties in England, compared with 24 in 1916, 25 counties showing an increase and 9 a decrease in the number of outbreaks compared with 1916. *Parasitic Mange* is only briefly mentioned in the Report, but it is stated that owing to war conditions, the disease has shown a tendency to spread.

Produce of Hops in England and Wales in the Years 1918 and 1917.*

The following is a PRELIMINARY STATEMENT showing the ESTIMATED TOTAL PRODUCTION OF HOPS in the years 1918 and 1917, with the ACREAGE AND ESTIMATED AVERAGE YIELD per STATUTE ACRE in each COUNTY OF ENGLAND in which Hops were grown. It is dated 17th October, 1918 :—

COUNTIES, &C.	Estimated Total Produce.		Acreage Returned on 4th June.		Estimated Average Yield per Acre.	
	1918.	1917.	**1918.**	1917.	**1918.**	1917.
	Cwt.	Cwt.	Acres.	Acres.	Cwt.	Cwt.
KENT: East ..	**23,303**	31,116	**2,371**	2,351	**9·83**	13·24
KENT: Mid ..	**34,870**	59,696	**3,336**	3,667	**10·45**	16·28
KENT: Weald ..	**34,720**	59,084	**4,032**	4,447	**8·61**	13·29
Total, Kent	**92,893**	149,896	**9,739**	10,465	**9·54**	14·32
HANTS	**5,984**	11,578	**717**	790	**8·35**	14·66
HEREFORD	**14,335**	29,536	**2,331**	2,629	**6·15**	11·23
SALOP	**384**	424	**48**	53	**8·00**	8·00
SURREY	**959**	1,474	**193**	189	**4·97**	7·80
SUSSEX	**7,060**	16,049	**1,310**	1,478	**5·39**	10·86
WORCESTER ..	**8,657**	11,762	**1,328**	1,342	**6·52**	8·76
TOTAL	**130,272**	220,719	**15,666**	16,946*	**8.32**	13·02

NOTE.—The total production of hops this year amounts to 130,272 cwt., or about two-fifths of the average production of the last ten years, on an area which has been reduced to less than half the pre-war average. The yield per acre (8·32 cwt.), while 4⅝ cwt. less than last year, is, however, only 1⅝ cwt. short of the average.

* A Preliminary Statement, showing the acreage of hops in England and Wales in 1918, was printed in this *Journal*, September, 1918, p. 765.

THE following Notice was issued by the Food Production Department of the Board on 11th October:—

Educated Women for Forestry.

Forestry is among the most delightful forms of outdoor work for strong young women. A number of women are required for training as forewomen for forestry work at once. During training they will receive 24*s*. per week, out of which they will have to pay for their board and lodging. After training they will receive 25*s*., rising at the end of three months to 27*s*., and when efficient to 30*s*. They must have had a good education and should apply to the Food Production Department, 72, Victoria Street, London, S.W. 1.

THE Ministry of Food have recently issued a 24-page pamphlet entitled "How to Feed the Family," which contains some very useful information for householders. It gives a number of war-time recipes, with the prices of different articles of food and the food value of various articles of dietary. Copies of the pamphlet may be obtained gratis and post free on application to the Literature Distribution Section, Ministry of Food, Room 605, Palace Chambers, Westminster, London, S.W. 1.

"How to Feed the Family."

Increased Prices for Cattle and Sheep.*

IN view of the importance of maintaining an even supply of fat cattle and sheep for consumption, and to meet the extra expenses incurred by farmers in holding back stock, the Ministry of Food has decided to increase in December by a further 1*s*. per live cwt. the price to be paid for cattle for slaughter, making the price of super first-grade cattle 78*s*. instead of 76*s*. as at present, and also gradually to increase the prices already announced for both fat sheep and first-grade cattle as from 1st February. The highest point in the new scale will be reached in May, when the price of first-grade beasts will be 10*s*. per live cwt. above to-day's prices, returning by gradual decreases to to-day's prices in August and September of next year.

These prices are intended to encourage the winter feeder to take immature beasts from summer grazing districts, and to reduce the numbers of cattle at present being offered for slaughter. The Ministry of Food is fully alive to the desirability of slaughtering all cattle as far as possible as they become mature, and steps have been taken to deal with the maximum number coming forward that can be disposed of. In order to conserve supplies for the winter and spring months, however, the Ministry of Food is bound in the national interests to limit the

* Reprinted from *Weekly Notes*, No. 18, issued by the Joint Committee of the Board of Agriculture and the Ministry of Food.

number of cattle accepted for slaughter both from Great Britain and from Ireland.

It is hoped that these increases will be covered by the recent changes, in the retail prices, and that there will, therefore, be no necessity to add to the cost of meat to the public.

All inferior cattle will be placed in the fourth grade, and will be sold by auction at prices not exceeding the maximum prices in force for the time being, or may be sold on the dead-weight basis as set forth in Circular Letter to Area Livestock Commissioners No. 192.* No cattle in the fourth grade will be covered by the Central Live-stock Insurance Scheme.

If, in the opinion of the person grading a beast, it is likely to yield an unusually small or large proportion of bone, the above prices may (except in the case of fourth-grade cattle) be varied by 1*s*., 2*s*. or 3*s*. more or less, but in no case shall the price for the first grade be exceeded by more than 1*s*. per cwt. for bulls, bullocks, and cows in excess of the maximum prices in force for the time being.

PRICES OF CATTLE PER CWT. LIVE WEIGHT.

Bulls, Bullocks, and Heifers.

—	First Grade.	Second Grade.	Third Grade.	Fourth Grade.
1918—	*s.*	*s.*	*s.*	*s.*
October	75	70	65	55
November	75	70	65	55
December	77	72	67	55
1919—				
January	78	73	68	55
February	80	74	69	55
March	81	75	70	55
April	83	75	70	55
May	85	75	70	55
June	85	75	70	55
July	82	70	65	55
August	79	70	65	55
September	75	70	65	55
Cows.				
1918—				
October	70	62	53	45
November	70	62	53	45
December	72	64	55	45
1919—				
January	73	65	56	45
February	75	66	57	45
March	76	67	58	45
April	78	67	58	45
May	80	67	58	45
June	80	67	58	45
July	77	62	53	45
August	74	62	53	45

* Issued by the Ministry of Food. Not printed in this *Journal*.

PRICES OF CATTLE PER LB. DEAD WEIGHT.

(Offals included in sale.)

	s.	d.
November, 1918	1	2¼
December, 1918	1	2¾
January, 1919	1	3
February, 1919	1	3¼
March, 1919	1	3½
April, 1919	1	3½
May, 1919	1	3½
June, 1919	1	3½

Sheep—Live Weight.

Graded Value of Sheep (without skin).	Increases per Head to Farmers.															
	Nov., 1918.		Dec., 1918.		Jan., 1919.		Feb., 1919.		Mar., 1919.		April, 1919.		May, 1919.		June, 1919.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Under 40s. ..	0	6	1	0	1	6	2	0	2	6	2	6	2	6	1	6
,, 50s. ..	0	8	1	4	2	0	2	8	3	4	3	4	3	4	2	0
,, 60s. ..	0	10	1	8	2	6	3	4	4	2	4	2	4	2	2	6
,, 70s. ..	1	0	2	0	3	0	4	0	5	0	5	0	5	0	3	0
,, 80s. ..	1	2	2	4	3	6	4	8	5	10	5	10	5	10	3	6
,, 90s. ..	1	4	2	8	4	0	5	4	6	8	6	8	6	8	4	0
,, 100s. ..	1	6	3	0	4	6	6	0	7	6	7	6	7	6	4	6
Over 100s. ..	1	8	3	4	5	0	6	8	8	4	8	4	8	4	5	0

PRICES OF SHEEP PER LB. DEAD WEIGHT.

(Offals included in sale.)

	s.	d.
November, 1918	1	2¼
December, 1918	1	2½
January, 1919	1	2¾
February, 1919	1	3
March, 1919	1	3¼
April, 1919	1	3¼
May, 1919	1	3¼
June, 1919	1	2¾

Soldiers for Threshing.

THE Food Production Department announced on the 15th November that the War Office have issued general instructions that all threshing-machine drivers, irrespective of category, now with the Home Forces are being released immediately on agricultural furlough. This arrangement will affect from 250 to 300 men, who will be distributed from the centres serving their counties of origin. It is believed that the release of these men by way of supplement to the labour resources already at the disposal of farmers will relieve the latter of any anxiety they may have felt as to the threshing of this year's crops.

Agricultural Returns of England and Wales, 1918: Produce of Crops.

PRELIMINARY statement, dated 11th November, 1918, showing the estimated total produce and yield per acre of the corn, pulse, and hay crops in England and Wales in the year 1918, with comparisons for 1917, and the average yield per acre of the ten years 1908-1917.

—	Crops.	Estimated Total Produce. 1918.	Estimated Total Produce. 1917.	Acreage. 1918.	Acreage. 1917.	Average Estimated Yield per acre. 1918.	Average Estimated Yield per acre. 1917.	Average of the Ten Years, 1908-1917.
ENGLAND AND WALES.		Quarters.	Quarters.	Acres.	Acres.	Bush.	Bush.	Bush.
	Wheat ..	10,534,000	7,165,000	2,556,706	1,918,485	33·0	29·9	31·0
	Barley ..	6,085,000	5,535,000	1,501,413	1,459,796	32·4	30·3	31·9
	Oats ..	14,336,000	10,865,000	2,779,429	2,258,909	41·3	38·5	39·3
	*Mixed Corn	620,000	—	139,077	—	35·7	—	—
	Beans ..	889,000	436,000	242,097	203,399	29·4	17·2	27·7
	Peas ..	439,000	277,000	127,857	102,962	27·5	21·5	24·9
		Tons.	Tons.			Cwt.	Cwt.	Cwt.
	†Seeds Hay	2,098,000	2,404,000	1,443,504	1,681,899	29·0	28·6	29·1
	‡MeadowHay	4,687,000	5,155,000	4,298,498	4,794,213	21·8	21·5	22·6
ENGLAND		*Quarters.*	*Quarters.*			Bush.	Bush.	Bush.
	Wheat ..	10,177,000	6,955,000	2,460,695	1,854,870	33·1	30·0	31·1
	Barley ..	5,668,000	5,198,000	1,394,861	1,364,630	32·5	30·5	32·0
	Oats ..	12,661,000	9,813,000	2,414,559	2,012,719	41·9	39·0	39·8
	Mixed Corn	507,000	—	111,726	—	36·3	—	—
	Beans ..	880,000	433,000	239,429	202,331	29·4	17·1	27·7
	Peas ..	437,000	275,000	127,147	102,374	27·5	21·5	24·9
		Tons.	Tons.			Cwt.	Cwt.	Cwt.
	Seeds Hay	1,917,000	2,184,000	1,301,694	1,504,255	29·5	29·0	29·5
	MeadowHay	4,221,000	4,622,000	3,812,485	4,246,066	22·1	21·8	22·9
WALES.		Quarters.	Quarters.			Bush.	Bush.	Bush.
	Wheat ..	357,000	209,000	96,011	63,615	29·7	26·3	27·6
	Barley ..	417,000	337,000	106,552	95,166	31·3	28·3	30·5
	Oats ..	1,675,000	1,052,000	364,870	246,190	36·7	34·2	34·9
	Mixed Corn	113,000	—	27,851	—	33·1	—	—
	Beans ..	9,700	3,500	2,668	1,068	29·1	26·7	27·3
	Peas ..	1,900	1,500	710	588	21·4	20·4	22·5
		Tons.	Tons.			Cwt.	Cwt.	Cwt.
	Seeds Hay	181,000	220,000	144,810	177,644	25·0	24·8	25·5
	MeadowHay	466,000	533,000	486,013	548,147	19·2	19·5	20·0

* Mixed Corn was apportioned in previous years among Wheat, Barley and Oats.
† Hay from Clover, Sainfoin, and Grasses under rotation.
‡ Hay from Permanent Grass.

NOTE.—*The yield per acre of all the corn crops in England and Wales* this year is above the average, and with the single exception of the small area of beans, the total production is also greater; while all are better, whether judged by the yield from an acre or by total production than in 1917. The yield of wheat is estimated at 33 bush. per acre (2 bush. above the average), and the total production, upon the greatly increased acreage, amounts to 10,534,000 qr., which is the largest quantity harvested since estimates were first officially collected in 1885, and exceeds last year's total by 3⅜ million qr. Special reports received from the Board's Crop Reporters indicate that a *certain proportion of the wheat has been damaged, especially in the northern* districts and in Wales, but the condition of the bulk is satisfactory. Barley has yielded 32⅜ bush. per acre, or half-a-bushel more than the average; the total production of over 6 million qr. is the largest since 1914. The production of oats is almost 2 million qr. more than the previous highest on record (1907), and amounts to 14,336,000 qr.; the yield of 41¼ bush. per acre is the best since 1910. Mixed or dredge corn, distinguished for the first time, produced an additional 620,000 qr. from 139,000 acres. The damage to barley and oats has been considerably more serious and widespread than in the case of wheat. Beans have given 29⅜ bush. to the acre, while peas, with 27½ bush., show the [illegible] gether the [illegible] on qr., or

The yield of seeds' hay (clover, sainfoin and grasses under rotation) is practically equal to the average, viz., just 29 cwts. per acre ; but that from the permanent grass ($21\frac{4}{5}$ cwt.) is $\frac{4}{5}$ of a cwt. below the average. Owing to the increased production of corn, the total amount, viz., almost 2,100,000 tons of seeds and nearly 4,700,000 tons of meadow hay, is less than that taken last year, in spite of the better yield per acre. The total production of hay of both kinds amounts to 6,785,000 tons, or fully three-fourths of a million tons short of last year's total, and nearly 1,100,000 tons less than the average from the much larger area of the ten years 1908-17.

The estimate of the hop crop was issued on the 17th ult. ; the returns of the production of potatoes and roots are collected at a later date, and will be issued subsequently.

IN the course of a speech in the House of Commons on 13th November, the Food Controller said :—

Supplies of Feeding Stuffs.

"In view of the change in the food situation, the restriction on the slaughtering of young pigs has been withdrawn. Instructions will now be given that in the allocation of additional feeding-stuffs care shall be taken that cottagers and those who have joined pig clubs can secure a sufficient quantity of offals to enable them to fatten their pigs. Several relief measures have been taken. The price of cattle and sheep will be increased as from December on a graduated scale. The highest point will be reached in May, when the price will be 85*s.* per live cwt. That was a measure of mere justice, providing reasonable compensation to farmers who were obliged to keep back their cattle at a time when we could not guarantee feeding-stuffs for them and at a time when, had we cousnmed any increased ration, we should have endangered our prospects of even a slender ration during the beginning of next year.

"The second measure that we propose to take—it has been authorised and approved by the Cabinet only this week, which shows that we have been urging these matters forward as well as we could—is in order to deal with the present heavy surplus of cattle from the grazing districts, estimated approximately at 18,000 head per week. Supplies have been first taken from these districts, and the markets in arable districts have been temporarily closed to local supplies. These markets are being supplied from adjacent grazing counties. Further, the use of barley for feeding-stuffs has been sanctioned by the Cabinet during the course of the day.

"Arrangements are now being completed to release to the farmer 20 per cent. of each thrashing of barley, the remainder being allocated to manufacturers, distilling, munition purposes, and stock-owners who do not grow barley. On a rough estimate, this should make no less than 3,000,000 qr. of food available for the feeding of stocks. Again, in order to assist pig-owners, the prohibition of the slaughter of pigs weighing less than 112 lb. live weight, as I have intimated, has been withdrawn. The steps taken as regards closing markets in arable districts I have already announced, and they are quite in accordance with the recent recommendations of the War Emergency Committee of the Royal Agricultural Society. As a result of the relief in the tonnage situation afforded by recent military events, the Cabinet have sanctioned a reduction of the percentage of flour to be extracted from wheat. This alone will mean a release approximately of 18,000 tons of offal weekly to the farmers—food which will be in every respect finer than that commonly used."

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for October, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Spain, Great Britain, Italy Luxemburg, Switzerland, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 250,233,000 qr. in 1918, against 210,086,000 qr. in 1917, or an increase of 19·1 per cent. *Rye.*—The estimated production in Spain, Italy, Luxemburg, Switzerland, Canada, and United States is placed at 13,912,000 qr. this year, or an increase of 26·1 per cent. compared with last year, when it amounted to 11,032,000 qr. *Barley.*—The production in Spain, Great Britain, Italy, Luxemburg, Switzerland, Canada, United States, Japan, Egypt, and Tunis is estimated to amount to 64,395,000 qr. in 1918, against 62,369,000 qr. in 1917, or an increase of 3·2 per cent. *Oats.*—It is estimated that the total yield in Spain, Great Britain, Italy, Luxemburg, Switzerland, Canada, United States, and Tunis will amount to 230,558,000 qr. in 1918, against 230,860,000 qr. in 1917, or a decrease of 0·1 per cent. *Maize.*—The production in Spain, Switzerland, Canada, and United States is estimated at 315,717,000 qr. this year, against 372,861,000 qr. last year, or a decrease of 15·3 per cent.

Sweden.—According to the official report for September the condition of crops was as follows, the corresponding figures for August, 1918, and for September, 1917, being given in brackets: (5=very good; 4=good; 3=average; 2=small):—Wheat, 3·0 (3·0 and 2·3); barley, 2·9 (3·0 and 2·8); oats, 2·8 (3·0 and 2·8); mixed corn, 2·9 (3·1 and 2·5); rye, 3·0 (3·0 and 2·0); hay, 2·1 (2·1 and 2·3); potatoes, 3·0 (3·3 and 3·7). The deterioration of some of these crops is attributed to heavy rains during September and the first half of October. (*The London Grain, Seed and Oil Reporter*, 1st November, 1918.)

Italy.—According to the latest official report the areas sown and yields of grain crops are given as follows, figures for last year and the average for five years, 1912-16, being given in brackets:—Wheat, 22,040,000 (17,196,000 and 22,124,000) qr. from 10,793,900 (10,432,100 and 11,764,600) acres; barley, 1,102,000 (886,000 and 1,129,500) qr. from 498,009 (466,800 and 605,100) acres; oats, 4,350,000 (3,504,000 and 3,221,000) qr. from 1,210,300 (1,090,500 and 1,189,300) acres; rye, 551,000 (505,000 and 588,000) qr. from 271,700 (270,950 and 290,470) acres. (*The London Grain, Seed and Oil Reporter*, 8th November, 1918.)

Spain.—According to the latest estimate, the acreages and yields of grain for this year are given as follows, figures for 1917 and the average for the five years, 1912-16, being given in brackets:—Wheat, 15,994,000 (17,830,000 and 15,740,000) qr. from 10,475,800 (10,335,770 and 9,820,720) acres; barley, 10,132,800 (9,352,100 and 8,893,600) qr. from 3,823,500 (4,003,900 and 3,638,100) acres; oats, 3,256,000 (3,478,000 and 3,130,000) qr. from 1,422,700 (1,398,000 and 1,346,100) acres; rye, 3,714,000 (2,823,000 and 2,930,000) qr. from 1,542,200 (1,803,800 and 1,882,100) acres; maize, 3,100,700 (3,425,000 and

3,225,000) qr. from 1,118,900 (1,175,700 and 1,138,600) acres. (*The London Grain, Seed and Oil Reporter*, 8th November, 1918.)

Canada.—According to the latest official estimate the yield of this year's wheat crop is given at 210,315,000 bush. against 233,742,850 bush. last year. The yield of oats is estimated at 457,000,000 bush. against 403,009,800 bush. last year, and the yield of linseed at 8,000,000 bush. against 5,934,000 bush. last year. (*The London Grain, Seed and Oil Reporter*, 5th November, 1918.)

India.—According to the final general memorandum on the wheat crop of 1917-18, issued by the Department of Statistics on 12th August, the total area under wheat is 35,497,000 acres as against 32,940,000 acres last year, or an increase of 8 per cent.; and the total yield is estimated at 10,174,000 tons (47,479,000 qr.) as against 10,234,000 tons 47,759,000 qr.) last year, or a decrease of 0·6 per cent. As compared with the average of the preceding five years, this year's yield shows an increase of 6 per cent.

United States.—According to the report issued by the Bureau of Statistics of the Board of Agriculture, the preliminary estimate of this year's maize crop is given at 2,749,000,000 bush., or an average yield for the whole country of 24·2 bush. per acre, against a total crop last year of 3,159,494,000 bush., and an average yield of 26·4 bush. per acre. The average for the last ten years was 25·6 bush. The crop of linseed is estimated at 15,000,000 bush., or 7·4 bush., a total crop last year of 8,473,000 bush. and an average of 4·7 bush. per acre. The weight of wheat is given at 58·8 lb., barley, 46·9 lb., and oats, 33·2 lb. per bush. against 58·5 lb., 46·6 lb. and 33·4 lb., respectively, last year. (*The London Grain, Seed and Oil Reporter*, 8th November, 1918.)

Argentina.—According to a report issued by the Statistical Department of the Ministry of Agriculture on 16th October, the areas of grain sown this season (1918-19) are as follows:—(figures in brackets are for 1917-18):—Wheat, 16,970,000 (17,576,000) acres; oats, 2,978,000 (2,854,000) acres; linseed, 3,418,000 (3,310,000) acres. As compared with the previous season (1916-17) there is an increase in every case. (*The London Grain, Seed and Oil Reporter*, 17th October, 1918.

Australia.—According to the final figures available, the total wheat harvest for 1917-18 is 121,772,385 bush., as against 152,420,189 bush. last year. (*Broomhall's Corn Trade News*, 12th October, 1918.)

Japan.—According to a consular report, dated Yokohama, 18th July, the official forecast of the Department of Agriculture and Commerce gives the probable yields of corn crops as follows:—Wheat, 30,607,360 bush., or some 3,300,000 bush. below a normal year; barley, 39,930,880 bush., or 5,600,000 bush. below normal; rye, 39,178,240 bush., or about 1,500,000 bush. below normal. Last year's crops were in each case considerably above normal. (*The London Grain, Seed and Oil Reporter*, 14th October, 1918.)

Mesopotamia.—According to an official announcement the harvest recently gathered under Army superintendence and assistance has realised 475,000 tons of grain. *Broomhall's Corn Trade News*, 4th November, 1918.)

Agricultural Conditions in England and Wales on 1st November.

THE reports furnished by the Crop Reporters of the Board on agricultural conditions in England and Wales indicate that during October the remainder of the corn crops were practically all secured, with a few exceptions in hilly districts, throughout the country. The late corn, especially barley and oats, suffered a good deal from the prolonged wet weather, much of it had sprouted, and generally the condition of such corn is only moderate. Most of the wheat had been got in earlier in satisfactory condition.

Potato lifting had been a good deal delayed by the wet weather and the late corn harvest, but good progress was being made towards the end of the month. There appears to be rather more disease in the south than was anticipated, but elsewhere such reports are few, and the quality generally is satisfactory. Very variable progress has been made with mangold-pulling : in some areas half this work has been done, in others it is only just commencing. Very few turnips and swedes have yet been lifted. The quality of the roots is reported to be good generally.

Autumn cultivation was much hindered during the first part of the month, but the more satisfactory conditions of the last week or two allowed of more progress being made. The sowing of wheat and other winter crops was generally well in hand by the end of the month, and in a few districts almost completed, but in many parts this work is backward. In some counties the plant is beginning to show above ground, and in such cases looks quite well.

Seeds are variable : on the whole they may be regarded as satisfactory, but there are many poor or patchy fields in most districts. In the west and north some damage has been done by the stooks standing too long in the field.

The weather has not favoured live stock, which have only done fairly well ; and the grass in the pastures, although generally plentiful, is of poor quality. Prospects for winter keep are, on the whole, only fair, though there will probably be ample straw.

The supply of labour is generally deficient, but farmers have been able to cope with the necessary work.

The following local summaries give further details regarding agricultural conditions in the different districts of England and Wales :—

Northumberland, Durham, Cumberland, and Westmorland.—The supply of labour is deficient, especially for potato-lifting and thatching stacks.

Agricultural Labour in England and Wales during October.

Lancashire and Cheshire.—Labour is generally short, but women and children are giving much help in potato-picking, and assistance is obtained from soldiers and German prisoners.

Yorkshire.—Skilled labourers are scarce, but, on the whole, the supply has met the need

Shropshire and Stafford.—The supply of labour is still short, but help has been given by women, children, soldiers, and prisoners of war.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is deficient.

Lincoln and Norfolk.—Labour is still very deficient.

Suffolk, Cambridge, and Huntingdon.—There is little change in the labour situation, the supply being below requirements as a rule.

Bedford, Northampton, and Warwick.—On the whole there is sufficient labour, though in some districts rather more could be usefully employed on potato lifting.

Buckingham, Oxford, and Berkshire.—Labour has been sufficient for the need.

Worcester, Hereford, and Gloucester.—The supply of labour is short on the whole, but there is some improvement in several districts, and with the aid of women, children, soldiers, and prisoners of war, the necessary work is being met.

Cornwall, Devon, and Somerset.—The supply of labour is still short, especially skilled hands, but women, children, soldiers, and prisoners of war have been of great assistance in potato-lifting.

Dorset, Wiltshire, and Hampshire.—The supply of labour is short, particularly skilled men, but with assistance farmers have been able to cope with the work.

Surrey, Kent, and Sussex.—The supply of labour is short, but the indispensable work has been done with such outside assistance as could be obtained.

Essex, Hertford, and Middlesex.—The supply is variable, but usually about sufficient to meet the needs. When no casual labour is obtainable, full advantage cannot be taken of fine days.

North Wales.—Labour is, on the whole, fairly satisfactory, and sufficient for the present need.

Mid Wales.—The deficiency in the supply of labour is rather keenly felt in some places, but in others, with temporary assistance, there is about sufficient labour to meet the needs.

South Wales.—Labour is still deficient, especially for skilled work.

AVERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of October, 1916, 1917, and 1918.

—	Wheat.			Barley.			Oats.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916.	1917.	1918.
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
London ...	63 7	72 4	74 3	55 4	60 9	60 8	33 8	44 8	59 0
Norwich ...	57 9	71 2	72 4	52 6	59 6	60 1	31 1	43 3	50 4
Peterborough	60 3	70 6	72 1	53 11	56 7	60 1	31 8	43 1	47 9
Lincoln ...	60 1	70 10	72 5	53 9	58 11	60 5	30 7	44 6	62 11
Doncaster ...	59 2	70 0	71 10	51 9	56 0	59 10	31 2	41 2	48 4
Salisbury ...	60 11	72 11	72 5	54 10	59 3	60 4	31 2	52 9	50 5

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
" 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
" 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
" 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
" 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
" 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
" 23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
" 9 ...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
" 16 ...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
" 23 ...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
" 30 ...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl. 6 ...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
" 13 ...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
" 20 ...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
" 27 ...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May 4 ...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
" 11 ...	55	5	78	0	73	5	53	5	64	11	56	6	33	1	55	2	47	6
" 18 ...	55	0	77	11	73	4	52	10	64	10	56	6	33	0	55	2	46	4
" 25 ...	54	7	78	0	73	3	52	9	64	9	56	6	33	4	54	11	47	8
June 1 ...	53	3	78	0	73	8	53	9	65	11	60	0	33	3	54	11	44	9
" 8 ...	51	2	78	0	73	11	52	8	67	7	59	2	32	7	55	0	45	5
" 15 ...	48	10	78	2	74	3	50	9	75	6	57	9	32	1	55	1	45	7
" 22 ...	47	6	78	1	74	4	49	10	75	0	58	5	31	3	55	2	47	8
" 29 ...	46	3	78	3	74	4	49	1	73	11	57	10	30	10	55	1	46	4
July 6 ...	46	3	78	1	74	4	45	6	69	5	61	7	30	8	55	2	46	10
" 13 ...	48	11	78	2	74	4	47	5	70	10	57	5	31	6	55	1	47	0
" 20 ...	51	6	78	3	74	3	48	8	72	1	60	5	32	3	55	2	45	4
" 27 ...	53	5	78	3	74	3	47	2	65	7	56	11	32	5	55	2	46	2
Aug. 3 ...	55	1	78	2	74	3	46	1	73	6	57	1	32	9	55	0	45	10
" 10 ...	56	7	78	4	74	7	46	11	76	1	57	7	31	2	55	0	46	3
" 17 ...	58	1	78	7	74	2	48	0	68	11	61	4	30	8	55	6	55	11
" 24 ...	59	0	76	7	74	8	47	1	70	7	62	6	31	6	54	7	56	9
" 31 ...	59	4	72	1	74	8	48	5	60	4	60	1	30	5	49	0	57	11
Sept. 7 ...	59	3	71	6	72	3	51	7	59	3	60	4	31	1	46	7	56	9
" 14 ...	59	11	70	7	72	5	52	6	57	2	60	1	30	9	45	0	49	2
" 21 ...	59	4	70	8	72	6	53	3	56	10	60	4	30	9	45	8	49	11
" 28 ...	58	10	70	6	72	7	54	1	58	5	60	3	31	1	44	7	50	3
Oct. 5 ...	59	2	70	8	72	8	54	5	57	9	60	3	30	9	44	9	50	9
" 12 ...	59	7	71	0	72	6	53	10	58	5	60	3	31	6	44	5	51	6
" 19 ...	60	9	70	8	72	7	53	8	59	3	60	3	31	11	44	1	50	9
" 26 ...	62	10	70	10	72	5	54	6	60	1	60	3	32	10	43	0	50	5
Nov. 2 ...	66	7	70	4	72	4	56	2	59	11	60	3	34	0	42	4	50	8
" 9 ...	69	8	70	3	72	4	58	0	60	2	60	3	35	8	42	11	49	11
" 16 ...	70	9	70	3			59	8	60	2			37	8	43	0		
" 23 ...	70	8	70	2			61	8	59	9			39	7	43	1		
" 30 ...	71	3	70	2			63	1	59	3			41	4	44	6		
Dec. 7 ...	72	1	70	7			65	6	58	7			44	1	43	5		
" 14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
" 21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
" 28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to rial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in October and September, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	October.		September.	
	First Grade.	Second Grade.	First Grade.	Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight
FAT STOCK :—	s. d.	s. d.	s. d.	s. d.
Cattle :—				
Polled Scots	75 4	70 1	75 5	70 0
Herefords	75 2	70 0	75 5	70 0
Shorthorns	75 0	70 0	75 1	70 0
Devons	75 2	70 1	75 2	69 10
Welsh Runts	—	—	—	—
Fat Cows	70 0	62 1	70 0	62 1
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d.
Veal Calves	12¼	10½	12	10¾
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	56 19	44 16	53 18	41 16
,, —Calvers ...	50 11	40 11	49 3	39 17
Other Breeds—In Milk ...	52 5	40 6	47 2	36 7
,, —Calvers ...	—	—	42 0	37 10
Calves for Rearing	3 15	2 15	3 15	2 15
Store Cattle :—				
Shorthorns—Yearlings ...	17 8	14 16	18 0	15 4
,, —Two-year-olds...	27 2	23 3	27 10	23 6
,, —Three-year-olds	34 17	30 18	34 9	31 9
Herefords—Two-year-olds...	28 5	24 16	29 17	26 9
Devons— ,,	25 19	22 6	26 12	24 1
Welsh Runts— ,,	26 1	22 8	25 15	22 15
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	59 11	47 10	57 9	46 9
Store Pigs :—				
8 to 12 weeks old	32 0	22 0	43 4	32 2
12 to 16 ,, ,, ...	66 1	48 7	76 9	60 5

* Estimated carcass weight.

OTE.—The prices per lb. for sheep do not include the value of the skins, which during October made prices equivalent to an additional 1¼d. per lb. of the carcass weight for *Downs*, Cheviots, and Cross-breds, ½d. for Longwools, and 1d. for Blackfaced, and Welsh, and during September 1¼d. per lb. for Downs, Longwools, Cheviots, Blackfaced, and Cross-breds, and 1d. for Welsh.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in October, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	133 0	133 0	—	133 0	133 0
	2nd	133 0	133 0	—	133 0	133 0
Cow and Bull	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	114 0	116 6	114 0
Irish: Port Killed ...	1st	—	—	133 0	133 0	133 0
	2nd	—	—	130 6	133 0	130 6
Argentine Frozen—						
Hind Quarters ...	1st	—	148 0	—	148 0	—
Fore ,, ...	1st	—	118 0	—	118 0	—
American Frozen—						
Hind Quarters ...	1st	—	—	—	148 0	—
Fore ,, ...	1st	—	—	—	118 0	—
Canadian Frozen—						
Hind Quarters ...	1st	—	—	—	143 6	—
Fore ,, ...	1st	—	—	—	113 0	—
VEAL:—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	112 0	93 6	93 6	93 6	93 6
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
English	1st	140 0	140 0	—	140 0	140 0
	2nd	140 0	140 0	—	140 0	140 0
Irish: Port Killed ...	1st	—	—	140 0	—	140 0
	2nd	—	—	140 0	—	140 0
Argentine Frozen ...	1st	—	140 0	—	140 0	—
New Zealand ,, ...	1st	—	—	—	140 0	—
Australian ,, ...	1st	—	—	—	—	—
LAMB:—						
British	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
New Zealand	1st	—	—	—	140 0	—
Australian...	1st	—	—	—	—	—
Argentine...	1st	—	140 0	—	140 0	—
PORK:—						
British	1st	—	160 6	158 6	162 6	162 0
	2nd	—	—	—	—	—
Frozen	1st	—	—	—	168 0	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in October, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	26 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
BACON :—						
Irish (Green)	—	—	—	—	—	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	60 0	57 6
Irish	53 1	—	52 0	50 4	54 10	52 10
Egyptian	—	—	—	—	—	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen ...	150 0	140 0	155 0	145 0	144 0	132 0
Arran Chief	150 0	140 0	148 6	141 6	142 0	128 0
Edward VII.	178 6	160 0	161 6	153 6	157 0	147 0
HAY :—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	OCTOBER.		TEN MONTHS ENDED OCTOBER.	
	1918.	1917.	1918.	1917.
Anthrax :—				
Outbreaks	15	15	204	363
Animals attacked	16	18	235	414
Foot-and-Mouth Disease :—				
Outbreaks	2	—	3	—
Animals attacked	6	—	14	—
Glanders (including Farcy) :—				
Outbreaks	2	2	27	23
Animals attacked	9	11	76	46
Parasitic Mange :—				
Outbreaks	132	79	3,724	2,036
Animals attacked	208	120	7,000	3,859
Rabies :—				
Number of cases	38	—	46	—
,, ,, Dogs affected ..	37	—	44	—
,, ,, other animals affected	1	—	2	—
Sheep-scab :—				
Outbreaks	5	16	265	420
Swine Fever :—				
Outbreaks	115	95	1,180	1,888
Swine slaughtered as diseased or exposed to infection	35	36	463	818

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	OCTOBER.		TEN MONTHS ENDED OCTOBER.	
	1918.	1917.	1918.	1917.
Anthrax :—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy) :—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange :—				
Outbreaks	—	1	92	41
Sheep-scab :—				
Outbreaks	34	31	256	323
Swine Fever :—				
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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EDITORIAL NOTES.

Agricultural Organisation.

AMONG the various factors which will take a part in the so-called reconstruction of rural Britain, one which is now receiving great attention at the hands of farmers is co-operative organisation, in relation to which a good deal of propaganda work has recently been done.

Many forms of small "Societies" and "Clubs" have long existed in different parts of the country, and many have locally proved very successful, as the different articles on co-operative insurance societies which have from time to time appeared in this *Journal* have abundantly shown. Some of the co-operative societies have grown into bodies having a well-developed organisation and doing a large business, such as the Preston and District Farmers' Trading Society, Ltd., referred to at page 1098, in which it is stated that farmers have invested over £40,000 of capital, that the membership has risen from 208 in 1911 to nearly 1,000 last year, that the last returns show sales of upwards of £360,000 per annum, and that the society now has mills or depots at 13 centres. Further, a great network of co-operative societies, both large and small, is spread throughout England and Wales, and the societies affiliated to the Agricultural Organisation Society now have an annual turnover of £8,000,000 and a membership of 130,000. Grants to the A. O. S. (see page 1058) have been made to enable it to organise new societies and extend and improve existing ones.

Something above and beyond all these societies is needed, however, and the aim of the professed leaders of agricultural co-operative organisation would appear to be to bring the whole agricultural industry under one great organisation managed on a business basis. The objects of such a farmers' organisation would be to reduce the cost of production; to buy wholesale the best fertilisers, machinery, etc., at the lowest

price; to sell on the soundest lines at the minimum cost; to reduce the number of superfluous middlemen; to guarantee quality of purchased goods (*e.g.*, fertilisers); to ensure just treatment of farmers by the nation; and to enable farmers to produce, as stated by Mr. Leslie Scott, "the amount of food the nation wants, of the kind it wants, at the price it wants."

As to the desirability of such an organisation the promoters have not a doubt, but as to whether it shall become a vital part of British agricultural life farmers themselves must decide. The facts put forward in the several articles in this issue of the *Journal* should enable farmers to conclude that the advantages of co-operative organisation are genuine and considerable, and that it will be to the benefit both of themselves and their neighbours if they join the movement.

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Farm Tractors.

MOST farmers will probably remember the days when the first motor cars could not run from London to Brighton (about 50 miles) in 12 hours. The distance can well be done now by motor more quickly than by the fastest express train. So recently as five years ago doubts were freely expressed whether the farm tractor was of any value other than for purposes of simple road haulage, and, perhaps, the driving of the smaller forms of stationary machinery. These doubts are being gradually swept away, and the magnificent work which has been done by tractors during the past two years must have gone far to convince farmers that there is a great future before them in regard to farm tractor work—ploughing, cultivating, rolling, reaping, binding, thrashing, timber cutting, etc. Much remains to be done in improving existing tractors, but there has already been marked progress since the outbreak of war. The official tractor scheme is declared (see the article at page 1045) to have fulfilled its object, to have enabled the county committees "in every instance to carry out their programmes for increased corn production" and to have "assisted them to reap their harvest." Some of the work done, indeed, has been remarkable, whether it be examined from the point of view of speed or of efficiency—and it has been done, and the land has been sown, when horse labour could not have succeeded in producing a seed-bed. Captain Hutchinson's article, epitomising the experience of the Food Production Department, will be read with great interest by farmers, who will do well to watch closely the case for farm tractors—for, if an "emergency scheme" run under great difficulties

during the stress of war could secure the results it has done, it seems quite certain that under ordinary conditions and in private hands the farm-tractor will save labour and prove an effective method of cultivation.

* * * * * *

A Chamber of Horticulture.

HORTICULTURISTS will read with pleasure the reference at p. 1110 to the inauguration of a Chamber of Horticulture, which should go far to secure greatly increased attention to all questions relative to the cultivation of vegetables, fruit and flowers. There might well be in the future a wider knowledge of the simplest means of raising the more readily grown flowers which beautify our gardens and serve to stimulate in such great measure the harmonious activities for which gardeners are justly famous. At the moment, however, the more practical questions for consideration relate to the stemming of food shortage, having in view the greatly increased production of fruit and vegetables. Whereas the cultivation of vegetables is still very poorly conducted by the rank and file of growers as compared with the best, there is still greater difference between owners of fruit trees. Unfortunately, the grower does not sufficiently recognise the importance of pruning, spraying, variety in reference to cross-fertilisation, manuring, storing, and so forth. The farmer's orchard, also, is too often very much neglected in these respects, and his fruit yields might often readily be doubled. The Chamber of Horticulture is specially designed to aid in increasing the produce from market growers' orchards. These are usually better managed than the gardens of private persons, since their business is wholly involved, but even extensive fruit plantations might well be improved. A badly-managed orchard is a danger to orchards which neighbour it. The new Chamber of Horticulture, therefore, will find plenty to do in stimulating increased production, in indicating the results of better methods, and in forwarding educational and research work.

* * * * * *

Cheese Schools.

THE winter months are hardly propitious for the purpose of cheese-making, but they offer a convenient time during which the advantages of cheese-making may be considered and arrangements may be made to start work next spring. Articles dealing with the question have already been published in this *Journal** and,

* See articles in this *Journal*, May, 1917, p. 170, "The Manufacture of Cheese in Co-operative Dairies," and June, 1918, p. 322, "The Services of the Co-operative Cheese Schools in the Formation of Milk Depots."

in view of the importance of both knowledge and co-operation, notes on the working of co-operative cheese schools appear in the present issue (pp. 1087, 1091). This report affords instructive reading, and shows that by co-operating, the milk suppliers received several direct benefits. Farmers in any given district might very usefully consider whether they might not start a co-operative cheese factory, and if so, whether they might not first take advantage of the benefits to be secured, as at Marlston, near Newbury, by arranging for the organisation next season of a co-operative cheese school. Should such a cheese school be desired the Board would be happy to make the arrangements in co-operation with the local authority.

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Basic Slag.

MANY farmers are fully acquainted with the value of basic slag for improving grass land, particularly on heavy soils, but there are, nevertheless, large numbers who do not make sufficiently extensive use of this phosphatic manure. It is no exaggeration to say that on some heavy land pastures the results of slagging have been marvellous—so good, indeed, that some very practical men have needed to see the improvement before they could accept the stated facts. Where grass was poor and thin, and clover was for all practical purposes absent, a dressing of basic slag in autumn has shown where it has been put on by the following summer, and trebly so the year after, clover coming well and strong and the grasses improving as the clover has developed. The classic experiments at Cockle Park* and the results obtained by Professor Somerville at Poverty Bottom† are well known cases in which basic slag has proved its worth; the former are referred to at p. 1102 of this issue of the *Journal*. Where basic slag has not previously been used the farmer should consider carefully whether he might not now employ it with advantage and perhaps consult the county agricultural organiser in doing so.

* See Supplement No. 10 to this *Journal*, "Influence on the Production of Mutton of Manures applied to Pastures." Price 4*d*. post free.

† See this *Journal*, February, 1918, p. 1186, "Poverty Bottom: An Experiment in Increased Food Production." This article has been reprinted as Miscellaneous Publication No. 20 of the Board. Copies may be obtained on application, price 2*d*. post free.

GOVERNMENT TRACTOR CULTIVATION IN ENGLAND AND WALES.

CAPTAIN G. T. HUTCHINSON,

Mechanical Cultivations Commissioner, Food Production Department.

IN order to appreciate properly the part played in British agriculture to-day by the tractor, and its possibilities in the future, it is essential to consider briefly the history of the tractors operated by the Food Production Department—the so-called Government Tractor Scheme. Without this information misleading conclusions might be formed, and full value could not be obtained from the lessons taught by the Government tractor.

Inauguration of the Scheme.—The scheme was instituted at a moment when, in consequence of submarine warfare, it became necessary to grow as much corn as possible, and to grow it against time, in the British Isles. To carry this policy into effect throughout the country, some increased and more rapid means of cultivation than those hitherto in practice were demanded. Even if sufficient horses had been available, their work was too slow for the emergency ; further, every team of horses required a man, and sufficient men could not be found. Nor could increased steam tackle meet the difficulty, for additional sets could not be procured quickly, and corn could be grown in many parts of the country where the geographical conditions made the use of steam tackle impossible. The Government, therefore, resorted to the tractor, which could operate in districts where steam tackle could not, and which required less labour and covered more ground than horses.

The Scheme Itself.—In these circumstances, little use could be made of the experience gained with the few privately-owned tractors in the country. It was considered necessary to purchase tractors of all types, wherever they could be found, to set them to work at once, and to deal with the question of suitable types and the renewal of worn parts as soon as the situation should permit. A beginning was made late in the spring of 1917, and the scheme was rapidly developed. In order to utilise the tractors to the fullest extent possible some system of centralised control had to be improvised, and at the same time local arrangements had to be made for working them, and keeping them in repair. These facilities were ...

plied by the mechanics and repairing shops of the motor trade, which was, in effect, entrusted with the local management, under the control of the Food Production Department. Tractors were received by each county as they became available; the Tractor Representative for the county, acting in concert with the Agricultural Executive Committee, arranged their work; they were manned mainly by soldiers from the Agricultural Companies; and they were kept running by the proprietors of the provincial motor garages.

Their task was to plough land at all costs, and the initial difficulty was to overcome the reluctance of the farmer to employ an untried and suspected means of cultivation. They could not wait for suitable weather or suitable land; the position was like that of a new business, where orders must be canvassed for, unremunerative contracts accepted, and a supply created, in the hope that it will create a demand. Such was the preparation by the Government tractors for the 1918 harvest. After the completion of the spring cultivation, it became possible to place the scheme upon a more workable basis. At one time, more than 20 types of tractors were employed by the Government, and the inconvenience and frequent impossibility of providing spare parts and repairs for each type constituted a serious handicap. Within the past few months it has been possible to reduce the types to 6, and to ensure the supply of spare parts, so far as war conditions permit. It has also been possible to decentralise the scheme, and to hand over to each county committee the control of the tractors allotted to it. In several counties a further advance has been made by loaning the tractors to individual firms to operate as a private enterprise, subject to such control as the county committees consider necessary. Experience has shown that with tractor ploughing, as with other forms of business, better results are obtained by private enterprise than by Government employees. It has also been possible to release tractors for sale to individual farmers, and since the beginning of this year some 3,000 to 4,000 tractors have been disposed of in this way.

Results of the Scheme.—To summarise briefly the results of the scheme, it may be said that it has fulfilled its object. It enabled county committees in every instance to carry out their programmes for increased corn production; it assisted them to reap their harvest; and it has introduced a new and highly

To form a proper estimate of the capabilities of this instrument, however, a careful distinction must be drawn between the tractor of the Government scheme and the tractor in the hands of the farmer. The former was employed as an emergency measure; in consequence its work was often imperfect, labour was wasted in connection with it, and operating expenses were high. In the hands of the farmer, on the other hand, the tractor economises labour and does the work cheaply. It would be most unfortunate if agriculturists should be tempted to base their opinion of the merits of the tractor solely on their experience of the tractor scheme.

Difference between the Government and Private Tractors.—The points of difference may be conveniently grouped under five headings.

(1) *Working Expenses.*—The first of these points concerns working expenses. The exigencies of the situation required that the Government tractors should be available wherever they were required. They were, therefore, grouped in units of (in most cases) 10 tractors, each unit serving a wide district. Steam tackle working under similar conditions would move from farm to farm as a self-sufficient unit, complete with plough, cultivator, and cabin for the crew; the farmer would have fuel and water ready in the field. The tractor, however, cannot haul its own fuel supply, and, under war conditions, the farmer cannot provide it. Petrol, paraffin, and grease must be delivered daily in a light motor van: this method is expensive, but delivery by horse transport would be too slow, and a motor lorry could not reach the inaccessible fields in which so many of the tractors are employed.

In cases of mechanical trouble, a mechanic must be summoned from the headquarters of the unit to effect the necessary repairs. From time to time a supervisor of some sort must also visit the tractor, to see that the men are working, and that the ploughing is satisfactory. With the privately-owned tractors these officials disappear; the farmer keeps the fuel in his coachhouse, supervises the work himself, and avoids the necessity of frequent repairs by taking care of his tractor. If bad weather stops the work, he can find another job for the driver, but the drivers for the 4,000 Government tractors, scattered in billets all over the various counties, often spend an idle day.

(2) *Repairs.*—The second point to be considered is the ques-

ment were built in America, where paraffin as a fuel is little used. The engine is designed to burn petrol or petrol substitutes, which are drawn off from the crude oil because of their volatility. Paraffin is a by-product of these oils and is not actually a volatile fuel oil. It has to be made so by means of an atomiser and superheaters, before being introduced into the combustion chamber. Time and experience are now meeting the difficulty, but last spring the work of the Food Production Department could not be delayed. Petrol could not be spared, but paraffin was available. Tractors were hastily adapted and worked with paraffin, and in some cases this has resulted in excessive wear of engine parts and consequent engine trouble. Competent mechanics have not always been obtainable when required, and the supply of spare parts, in wartime, in sufficient numbers for the Government tractors, has been a perpetual difficulty. The critic who concludes that the tractor is no good, because he has seen one standing idle for weeks in the field, should enquire whether it is in fact waiting for a spare part which lies at the bottom of the Atlantic! The peace-time tractor will not suffer from this handicap.

(3) *Nature of the Work.*—A third point to consider is the difference in the nature of the work which the Government tractor and the farmer's tractor are required to perform. For various causes, which it is unnecessary to discuss here, in nearly every part of England some very unsuitable grass land has been ploughed up within the past twelve months, and the most unsuitable has usually been allotted to the Government tractors. Much of this work has not been ploughing, but reclamation. The Government tractors carried out some astonishing performances last spring. They dug themselves deep into the Midland clay, they broke implements innumerable on the concealed rocks and boulders of the west country, and they skidded vainly about the hillsides of Wales and the North. Fatal accidents were not unknown, but land was ploughed—at a cost—and crops were grown: it was "magnificent, but not agriculture." No doubt this reclamation work has already justified itself, and the average farmer will not purchase a tractor to reclaim land, but to plough.

Government tractors were also operated in typical grass counties in the Midlands and in the West, where each farmer had sacrificed one field to the good cause. Here the fields themselves might be suitable, but the amount of roadwork involved in going from farm to farm, with consequent high fuel

›nsumption and wear and tear to the tractor, made economic orking impossible. This difficulty will not apply to the ırmer's tractor.

(4) *Labour.*—A fourth point of difference is labour. At the nd of the spring cultivations in 1917 the Food Production)epartment was operating about 600 tractors; at the same ›eriod in 1918 it had over 4,000. Drivers had to be found .nd trained from such material as the exigencies of war left ıt the disposal of the Department. When the Government .ractors are disposed of, these men will be available for the 'armers, and already measures are being taken to assist the training of drivers for privately-owned tractors. The farmer will at least be able to select a suitable man to train for his tractor, but the Food Production Department was never in a position to pick and choose. A most encouraging feature is the excellent results so frequently achieved by the hastily-trained Government drivers, and the satisfaction which women drivers have given in so many counties.

(5) *The Implements Used.*—Another advantage which the farmer's tractor will have over the Government tractors is that the farmer will be able to attach it to the plough or cultivator which is most suitable for his particular requirements, whereas the Government tractor is limited to such implements as are now available. In nearly every part of the country the experience of generations has evolved a special plough, cultivator, or harrow, to deal with local peculiarities of soil or cultivation, many of which are manufactured locally. In war-time the output of such implements is limited, and if all are commandeered by the Government, the demands of private purchasers cannot be met. It has, therefore, been necessary to purchase implements in bulk for use with the Government tractors,—largely in America, in order to carry out Government cultivation without unduly curtailing the supply available for individual farmers. It is, however, unreasonable to expect that their work should be equally satisfactory in all localities. One type of Oliver plough made to turn a wide furrow has proved unsatisfactory on hard ground, until converted to turn a narrower furrow. In some counties a heavier cultivator than those cultivators now obtainable is demanded. In these cases it is manifestly unfair to condemn the tractor because the right cultivator's implement is not obtainable, and the work has suffered in consequence.

Possibilities of Tractor Cultivation.—It remains to consider what profitable conclusions can be drawn from the experience

of the Government tractor scheme as to the possibilities of tractor cultivation in England.

In the first place it is established that to obtain the best economic results from the tractor, it should be in the hands of the farmer, and should not leave his farm, except perhaps to assist his immediate neighbours, in cases where such an arrangement is possible. Though there is no doubt that tractor ploughing firms will be started, to carry out work on the same lines as the existing steam ploughing firms, the difficulties of fuel supply, roadwork, and supervision, must always place this system at a disadvantage, when compared with the privately-owned tractor.

Work Done.—Sufficient has already been said to indicate that the acreage results achieved by the Government tractor must not be accepted by prospective purchasers as a final test of their capabilities. The statement of weekly averages in the counties, circulated by the Department, shows that few counties are able to maintain an average of 10 acres ploughing per week per tractor in commission, or a fuel consumption below 5 gal. per acre. In nearly every county, however, a Fordson tractor, with a self-lift plough, has ploughed over 5 acres in the day under favourable conditions, in the hands of one reasonably competent man or woman. The same tractors have frequently cut upwards of 15 acres in the day with a binder, which would not be exceeded by two teams of three horses working in two shifts. The fuel consumption of the farmer's tractor should be in the region of 3 gal. per acre ploughed.

Quality of Work.—It has also been proved in every county that the quality of the work done by tractors can be perfectly satisfactory. It serves no useful purpose to compare their work with that of horses or steam tackle, because all three will be required; it must depend on circumstances in each case which method can be, or should be, adopted. Plenty of bad work has been done by the tractors, the reasons for which have been fully explained. The best testimony in their favour is the verdict of the farmer, and whereas a year ago it was necessary to canvass for orders for work for the limited number of tractors available, to-day, in practically every county, the tractors are scarcely able to carry out the daily increasing number of contracts for ploughing.

Quick Work.—It is now realised that the tractor enables the

of

this is appreciated by every practical farmer. Theoretically, if a man has the requisite " strength " for his farm, he should be able to keep it employed throughout the greater part of the year, and to carry out the successive operations of husbandry, each in its proper course. In practice, climatic conditions make this impossible. One operation is delayed by the weather and subsequent operations suffer.

The broad distinction between the bad and the good farmer is that the former is usually in arrears and the latter beforehand with his work, because he has a reserve of " strength " to meet these emergencies. The tractor provides a reserve of cultivating strength which eats nothing and costs nothing when it is not employed. For example, during the past summer many farmers were able to employ all their horses for leading their earliest corn crops, while the later ones were being cut with tractor and binder, and by this means to complete their harvest before the weather broke. The same men could then plough their stubble with the tractor while their horses were still leading the later corn crops. Their neighbours, without this additional " strength," have had corn spoilt and have afterwards had to spend idle weeks waiting to plough their sodden stubbles. There is always a certain period of the year when the soil is in the proper state for ploughing; it is then possible to plough better and deeper, leaving the ground in good condition for subsequent cultivation, and for preparation of the seed bed which will give the best yield. If this opportunity is lost because the normal strength of the farm is otherwise employed, it cannot easily be recovered—on heavier soils it may mean a year's delay—but with the tractor it need not be lost. It is a notable fact that in some counties, in spite of the wet autumn, work on the farms is actually more advanced to-day than it was at this time last year—thanks to the tractor.

Types of Tractors.*—It is often asked, which is the best sort of tractor to buy? The Food Production Department have employed more than 20 different types, all of which have had their good and bad points. Six types have now been retained, but it must be remembered that, in eliminating, the possibility of ensuring an adequate supply of spare parts for the types retained was an important consideration. Of these, the "*Titan*" has done excellent work under the most variable conditions. It has ploughed on the Devonshire hillsides and in the holding clays of the Midlands, and it has been used as a stationary engine to thresh, to cut chaff, or work a saw. The

: also be consulted.

main improvements which have been made in some cases are a better fore-carriage, and special spuds on the wheels to hold on slippery ground.

Another "general utility" tractor is the "*Overtime*," and many of these tractors have now been in the hands of private owners for upwards of a year, and have given satisfaction.

The "*Clayton Shuttleworth*" is a powerful and more expensive tractor, which has been found specially suitable on heavy clay land, as the pressure on the land is considerably reduced by a "caterpillar" track. It is the only tractor of this type now operated by the Department.

The "*Saunderson*" is another British-made tractor, which has the advantage of a winding drum, and has therefore been in request for threshing, as the drum enables it to haul a threshing box up a steep pitch in a country lane. It has been found more satisfactory than other tractors for roadwork.

The "25 *H.P. Mogul*" is a heavy tractor, employed mainly for threshing, but in some counties it has done a lot of work with the plough, while the land was in a suitable condition. It is too heavy for use on wet land.

The "*Fordson*" tractor is probably the cheapest tractor on the market, and, if its limitations are recognised, it is the best labour-saving device which the farmer can obtain. It is the only Government tractor equipped with a self-lift plough, and can, therefore, be worked by one man. It is not yet a "general utility" tractor, as it may prove to be too light to be used effectively as a stationary engine, but for the purpose of cultivating it is an acknowledged success. It is often said that it is unsuitable for heavy land, but its success in Essex and other heavy-land counties has led its adherents to believe that, when heavy land is in the proper condition for ploughing, the Fordson can plough it, and when it is not, it is best to leave it alone. No less than 2,500 of these tractors have already been purchased by private owners, a fact which indicates the farmer's opinion of its merits. For some time its reputation suffered because the No. 7 Oliver plough turned a 14-in. furrow, which in many cases proved unsatisfactory. This plough has now been converted to turn a 10-in. furrow, with the best results, and two other types of Oliver plough, one of them specially adapted for ley-ploughing, will shortly be on their trial in the counties. Other improvements now being carried out by the Department are the provision of a "governor" for the engine, a brake for roadwork, and a "release" attached to the draw-bar, to prevent accidents in case of the tractor rearing

FIG. 1.—Titan Tractor and 3-furrow Ransome Plough. Ploughed 13 acres of turf in 3 days.

FIG. 2.—The 13 acres referred to in Fig. 1.

FIG. 3.—Fordson Tractor hauling Self-Binder.

G. 4.—Fordson pulling Binder up-hill, cutting a 40-bushel crop of Wheat.

... a very ancient type of plough still in use, and a Fordson at work on the other

FIG. 6.—A 25-H.P. Mogul Tractor and 3-furrow Plough.

FIG. 7.—A Titan Tractor with Plough and Land Presser.

up. In some cases, too, it has been found necessary to alter the strakes on the wheels, in order to gain a better hold on slippery ground.

How to Select a Tractor.—Unquestionably the proper course for a prospective purchaser to adopt is to examine the work of his neighbour's tractor, or of the different types of Government tractors in his county, before making his selection. He should have no difficulty in obtaining full information from the officials employed by the Executive Committee of his county, and by this means he can see and judge for himself which type is best suited to his particular requirements. He should also remember that the implement is just as important as the tractor, and can form his own opinion of the former by examining the various makes now utilised by the executive committees. For example, the work of the disc cultivator, and of other new implements, may be inspected with advantage. It may be added that, though tractors will undoubtedly be improved, it is better policy under present circumstances to purchase one of the reliable tractors now available than to wait for a perfect type. It is vain to hope for a tractor which will be equally good for cultivation and road haulage. Presumably the motor lorry represents the best type of internal combustion engine for road work, and it is impossible to imagine any form of motor lorry which could be utilised with a plough.

If British agriculture is to derive full advantage from the experience of the Food Production Department, much can be done by the executive committees of the counties. These committees have recognised that the Government tractors *must work primarily for those farmers who could not cultivate* under present circumstances without assistance, and that applications for tractor ploughing received from farmers who should be in a position to cultivate for themselves must be deferred. The latter should purchase their own tractors or more horses. It is to be hoped that the time is not far distant when all farmers will be in a position to dispense with Government cultivation. Meanwhile, committees can place at the disposal of the farmers the experience gained with the different types of tractors and implements employed in their county.

The writer of these notes has prepared them after seeing something of the work of the Government tractors in practically every county in England and Wales, and after discussing the difficulties encountered and the results achieved, with those who have operated the tractors since the inception of the scheme. Any points which may be described as technical have been

carefully verified by the experts employed by the Food Production Department. Though criticism of the tractor scheme is by no means unknown, there are no two opinions as to the value of the work of the tractors, and it only rests with the farmer to take advantage of what is probably the widest form of practical demonstration ever carried out by an Agricultural Department.

THE DEVELOPMENT OF AGRICULTURAL ORGANISATION.

Sir R. HENRY REW, K.C.B.,

Assistant Secretary, Board of Agriculture and Fisheries.

THE advantages which farmers would gain by combination for their mutual interests have long been recognised in theory, but very imperfectly realised in practice. For certain purposes, indeed, farmers have long shown some readiness to combine. There are hundreds of societies and clubs throughout the country, many of them of considerable antiquity, which exist mainly for the improvement of farm stock. No doubt many of them are largely supported by landowners and others interested in agriculture, but they nevertheless include a large proportion of tenant farmers, who have associated themselves together for practical objects. Combination of farmers for their general interests as a class has also had partial success, as in the Central Chamber of Agriculture and the Farmers' Union. But it, nevertheless, remains true that farmers are reluctant to combine, and that if for a time they are induced to do so they are apt very quickly to fall away. Under the influence of persuasive eloquence, or the stimulus of some political grievance, they may join an association, but when the second or third subscription falls due they begin to ask what they are getting for their money—a question to which a very definite answer is not always immediately obvious. Altruism is not a characteristic virtue of any class of Englishmen, and it is perhaps especially inconspicuous among farmers. The British farmer is a very practical person, with a strong tendency to individualism, and a rooted objection to unremunerative outlay.

It is now about a quarter of a century since, after some experience of agricultural organisation in different phases,

I became convinced that a national association of farmers on a scale commensurate with their numbers as a class, and their importance in the country, was only feasible if direct commercial objects could be combined with the more indirect political and economic objects, to which attempts at establishing such associations had generally been restricted. The really powerful class organisations in this country are those which offer pecuniary advantages to their members, as well as the more impersonal benefits to be attained by joint action in the interests of their class. I used such influence as I then had with the Chambers of Agriculture to induce them to take up the question from this point of view. Two committees explored the subject in considerable detail, and the report which was presented in 1898 on Co-operation for the Sale of Agricultural Produce attempted to sum up the position as it then appeared, and recommended the establishment of a "Co-operation Section" of the Central Chamber of Agriculture. That proposal was supported by many of those who at that time were among the more far-sighted leaders of agricultural opinion, and, if it had been possible to develop it, the initial difficulty of enlisting the aid of the larger farmers in promoting the principles of agricultural co-operation might possibly have been overcome, and the whole movement might, perhaps, have been accelerated. The organisation of the Chambers of Agriculture then, as now, comprised a large number of local bodies, which varied a good deal in the scope of their operations, and some of them, at that time, had adopted the principle of co-operation in one form or another—usually for the purchase of farming requisites. It appeared that by the process of building up on existing foundations the adoption of the principle might be gradually extended throughout the country, with the assistance and support of those who were recognised as the leaders of the agricultural community. There were obvious objections and difficulties attaching to this mode of procedure, and it may be that the establishment of a new and independent association was the better course. A year or two after, the late Sir R. Yerburgh, who was a member of the Committee of the Chamber of Agriculture, and approved its report, established the Agricultural Organisation Society, which has now become a powerful and widespread association. The position which it has now attained, and the work it is doing, are indicated by Mr. Leslie Scott and Mr. Acland in the papers which appear in this number of the *Journal*. It may be noted that the initial difficulty referred to above still remains, although, thanks

largely to Mr. Scott's own energy and enthusiasm, the interest and assistance of the larger farmers are now being rapidly enlisted in the movement.

In numbers, what may be termed large farmers are more limited than is sometimes realised. There are 51,767 holdings of more than 150 acres in England and Wales, of which no more than 14,126 exceed 300 acres. But the influence of these farmers is not to be measured by their numbers. Each of them is in a large degree an example which those who occupy smaller farms attempt to imitate, for the tendency of even the small holder to copy the methods and practice of the larger farmers in the district—sometimes quite unsuitably and unwisely—has often been remarked. No doubt it is difficult to bring the large farmer and the small holder on to the same commercial plane, but the problem, though difficult, is not insoluble, and if farmers themselves assist there is good reason to believe that the Agricultural Organisation Society can, and will, solve it.

The principles stated in the report to which reference has already been made, are generally accepted. While co-operative purchase of farming requisites is easy, co-operation for the sale of produce is very difficult. The advantage of associations of producers in particular districts, for the joint disposal of certain classes of produce, is particularly marked in the case of farm produce subjected to a process of manufacture, such as the conversion of milk into butter or cheese, the curing of bacon, or the making of jam. Co-operation for the sale of live stock and for the sale of milk had, twenty years and more ago, been undertaken with success. The tendency, both at home and abroad, for co-operative associations to be specialised—*i.e.*, to confine their operations to a particular kind of produce, appears to continue, and probably affords the best, if not the only, means, in most cases, of getting the co-operative principle accepted in a district, leaving the linking up of specialised societies to a later stage of development.

It is a platitude that British agriculture, with the British nation, and indeed the whole world, is entering a new era, of which all that can at present be said, with certainty, is that the conditions will be different from any which have previously existed. Whatever the future may bring, however, it is clear that farmers will find combination not less necessary than before, and that in developing that form of it which is commonly known as co-operation, they will be wise in their day and

AGRICULTURAL ORGANISATION, WITH PARTICULAR REFERENCE TO GUARANTEED MINIMUM PRICES.*

THE RT. HON. F. D. ACLAND, M.P.

MY address has had to be put together hurriedly, mostly on railway journeys, because of the pressure of more important work. That work has largely been the getting in of my potatoes, and I am sure you will all agree with me that when this has to be done everything else is of less importance and has to be fitted in where it will go.

When I have thought of introducing the subject of Agricultural Organisation to this Club I have wondered where to begin. But as one of our wisest members said to me last week—What is this Agricultural Organisation? I must clearly begin at the beginning.

The Co-operative Movement.—Agricultural organisation, in the sense in which I shall speak of it, is a movement of co-operation of farmers, small holders, or allotment holders in societies registered under the Industrial and Provident Societies Acts, which now contain about 70,000 large and small farmers and about 100,000 allotment holders. There are about 450 farmers' societies of this kind now in existence, and about 550 allotment holders' societies, and their annual turnover is about £8,000,000. They vary in size from the Eastern Counties Farmers' Co-operative Association of 2,400 members whose holdings average over 250 acres, spread over several counties in East Anglia, with a turnover of over three-quarters of a million, to small village or suburban allotment societies, which exist, perhaps, merely for the sake of taking a piece of land in co-operation.

I must give some figures, but I will condense them. There are many sorts of societies, and in round figures they are grouped thus:—allotment societies 540, farmers' societies for purchase of requirements 250, eggs and poultry societies 70, fruit societies, co-operative auctions, etc. 60, dairying societies 50, credit societies 22. The first societies joined the movement in 1901, when we had 25. Taking this year and the four dates following 1905, 1910, 1915 and 1918, the numbers were, roughly,

25, 125, 400, 550, 1,000 ; membership for the five dates 500, 7,500, 24,000, 55,000 and 155,000 ; turnover £10,000, £220,000, £1,100,000, £3,000,000 and £8,000,000.

The Agricultural Organisation Society.—The movement to which these societies are affiliated is called the Agricultural Organisation Society, or more usually the A.O.S. After much devoted pioneer work it was started in 1901, and for years it owed its progress and almost its existence to the late Sir Robert Yerburgh. For years it depended purely on the support of friends of co-operation, nearly all landowners. They put up about £2,000 a year to run it during the first eight difficult years, and have kept the voluntary subscriptions at about £1,500 a year since. Affiliation contributions from societies remained generally below £100 till 1912, and have only last year, with great difficulty, been squeezed up to £1,000.

The Small Holdings Fund began to help in 1909 and has given something near £2,000 a year since then. The Development Commissioners have given about £8,000 a year since 1912, and last year £15,000. This year's budget is for £24,000, and towards this sum the Development Commissioners give a block grant of £6,000 and pound for pound in voluntary contributions, and £4 for each £1 in affiliation fees from societies. There is also at present a special allotment grant of £10,000, mostly from the Food Production Department.*

For many years the movement was run mainly by an Executive who elected themselves, or one another, but during the past year it has been reorganised on an absolutely democratic basis. Fifteen branches have been set up covering all England and Wales. In each there is a branch committee responsible for organisation and propaganda, elected by the societies in the area on a basis which combines membership and turnover in a way which gives both the societies which are small in membership with a large trade, and those with large membership and small trade, a fair share of control. The branches are grouped into seven provinces for the election of governors on the same voting basis.* Co-option of governors is reduced to a minimum. Each branch has a minimum staff of a branch secretary and an allotments organiser. The Society, besides being self-governing, is to become far more self-supporting. The affiliated societies are largely increasing their affiliation fees. Unless they do it, and with a will, the Government grant will, quite rightly, be withdrawn.

The principles of working the societies are very simple. Membership should be confined to actual cultivators of land. The capital should be provided by the members taking shares and paying up on them whatever proportion of their value is required. Liability is limited to the unpaid amount of the shares taken. The number of the shares that may be taken is unlimited, the interest that may be paid on them strictly limited. The profits, after this limited interest is paid, are distributed as a bonus on business done. Most societies do not aim at high bonuses but rather at buying cheaper or better, and giving better prices on sales than would otherwise have been obtained. Thus recently a society had 1,700 sacks of maize and the market price went up 10*s.* a sack. The society sold at the original price, giving members an advantage of between £7,000 and £8,000. Another society had 1,500 tons of decorticated cotton cake bought at £11 12*s.* 6*d.* a ton. The price went up to £15 15*s.*, but the society sold at £11 15*s.*, making only 2*s.* 6*d.* a ton towards profits, but saving the buyers £6,000. Similarly a decent society which buys cake will sell it again as cake within the fixed prices, and not grind it up into meal and sell it at double its value, as is done elsewhere.

Examples of Co-operative Societies.—Let me give some examples, taken almost at random, which will illustrate the sort of work a society can do.

The Auction Markets at West Bournemouth and Boscombe.—There are collecting depots for vegetables, etc., in nearly every village around Bournemouth. A motor lorry collects the produce of the small producer. On the following day it is put up in small household lots and sold by auction to Bournemouth householders. The produce is fresh, and the prices are less than shop prices, but the producer gets from 30 to 60 per cent. more than he would without the society. About £15,000 worth of produce is sold annually. Producer and consumer are brought together directly, by the work of the society, in a way that would not otherwise be possible.

Preston and District Farmers' Trading Society.—This is a society of small farmers, its object being to purchase pure feeding stuffs at reasonable prices. The society was started in 1903 under another name and languished till 1909. The sales went down from £800 to £300, and the profits from £14 to £5. But note the virtues of sticking to it. The society was moved to Preston and re-formed. Between 1911 and 1915 the member-

Share and loan capital was subscribed up to an average of £30 per member. Mills were bought at Liverpool. The warehouse and offices are at Preston and there are eight branch depots. Grain is taken *ex*-ship to the mills, ground and sent direct to the depots and delivered in the society's waggons. No price lists are issued and often no prices are quoted. The traveller tells the farmer what the society can supply and what is the best value from time to time, and the farmer orders, knowing that it is in the society's interest to charge him the lowest price possible. Farmers' cheese and corn are bought and other steady developments are made owing to the farmers' willingness to put up capital. The success attained is due to the awakening of a real co-operative spirit by close organisation of a fairly limited area.

Urmston, near Manchester.—Here is a typical allotments society. It started in 1916 and took a field of 5 acres, let to tenants at 10*s.* for 350 square yards. Fencing was done by members in spare time, and a large central plot was left for experimental and charitable purposes. Next year the holding was five fields of 12 acres, cultivated by 190 holders. Tool-house, barrows, scales, sprayers, and seeds are bought co-operatively. A contract is made with a local co-operative society for all its stable manure. Artificials and seedlings are bought in bulk, and 7,000 jam jars are distributed. Wart and other disease is kept out of the potatoes, by buying immune varieties and spraying. Flowers have to be planted on the ends of the plots next the high road. Lectures are held, and a National War Savings Society is established. All is done on an income of £112, and an expenditure of £80. The special features here are the real keenness for genuine co-operation among the cultivators and the production of far more and far better produce at less price than would have been possible without the society.

Lastly, the *Wiltshire Farmers.*—About them I point out this only—membership was increased from 600 in 1916 to 1,200 in 1917, not by enlarging the area, but by careful organisation on the old ground. Of the 600 new members 120 were holders of 5 acres or less. The members produce milk, sending it to two depots, where it is cleaned, pasteurised and chilled. Result —none of their milk is ever lost as sour. Of the ordinary London supplies 2 per cent. are lost as sour in the summer, 1 per cent. in winter. This, on the basis of figures given in

of about £150,000 a year. The special feature of the co-operative method is that the public gets a regular standardised pure supply, *with no grading down to the statutory figure of butter fat*, and this it would not get without co-operation.

Possibilities of Co-operation.—So far I have simply tried to show that there is a movement which is doing something worth thought, study, help. The road which it has still to cover is, perhaps, even more worth thought and study, and to cover it still more do we want help from all persons of goodwill. There is much need. For years after the movement started it grew, but did not really strike its roots deep. It did not, for instance, gain the confidence of the big farmers. So the men who in the past year or two have been putting new life into it—amongst them first and foremost Mr. Leslie Scott—have much before them. For instance, in some great counties in England the movement hardly exists. Then the areas covered by societies must be delimited and each area worked intensively, for it ought to be thought bad form by farmers to take advantage of the existence of a society to bring down prices and secure closer competition from traders—and not to join it themselves. Again, societies have been content with little, they have just appointed a manager who was an expert buyer of supplies; they have taken no care to push the co-operative principle into all the corners of their life and industry. Again, there are spheres of work almost unexplored, promising good results alike to the farmer and to the community. For instance, we have only five co-operative slaughterhouses; we need 500—for good farmers will quite steadily come round to the dead-weight basis. Official schemes of providing credit in connection with societies are few; they should be increased. It should be an integral part of the work of societies to help in keeping their members' accounts and in determining their costs of production. Milk recording, the elimination of bad bulls, and the systematic inspection of dairy herds, should be a part of the work of all dairy societies; and we should handle far more milk than the present 150,000 gal. a day. Co-operative purchase and owning of implements, particularly tractors, has a great future, but is still in infancy. The system of control in the sense of the Irish Creamery Butter Control should be grafted into our producing societies. The control allows its trade mark to be used only if butter is produced under conditions the most sanitary, scientific and skilful that can be applied to the industry. So it should be all round. There

should be a guarantee to the public that anything bought from a co-operative agricultural society represents a standard of quality in the product and an avoidance of waste in its manufacture which is the very best that human skill can accomplish.

But there is more—and in this that follows, as in all my co-operative faith, I have to acknowledge my deep indebtedness to Mr. George W. Russell, the Editor of the "Irish Homestead," for years past, and I hope for years to come, the spiritual head of the movement for co-operation in agriculture.

The Influence of Town on Country Life.—The greatest need of the movement now is vital heat, an ideal to work for—a soul to warm it up. At present its body and bulk are more apparent than its soul. Country people are the great stable human element in the life of a nation, and certain elemental human virtues are found more often in the country than in towns. Yet there is, on the whole, a steady flight from the land, not only here but in Ireland, in very many countries of Europe, and in America. Of the millions who go from England to the United States none go on the land, for the agricultural population there has been stationary for half a century. Why should rural life seem in danger of breaking up? The beast and the bird have tended to replace man in England, deer to replace man in Scotland, machines in America. Why? Partly because the city is always wresting from the country its arts and industries, and those which it cannot convey to the town it tries to control. Weaving, spinning, boot-and-shoe making, brewing, tailoring, hosiery and many other employments have gone irrevocably from the home to the factory. A crowd of keen-witted business men have come with offers to the farmer. They will sell his stock for him, market his produce, manufacture his bacon, bake his bread, and wherever the country dweller has given way and yielded to their insidious offers, he has become poorer than before, his intellect less active, and the countryside has grown more helpless and deserted.

Some people criticise agricultural co-operation as confirming and intensifying this tendency. They think of a society only as a set of farmers who have combined to get an expert business manager to do for them what they used to do for themselves. I hope to show that it can be more than that and can greatly increase instead of diminish the farmer's interests, and give him opportunities for the practical application of his citizen-

remove agricultural industries and interests from country to town has come an enormous facilitation to travel. The world is all spread out before the agricultural labourer and before the farmers' sons and daughters to choose where they will live, and the general tendency has been for them to go partly to the towns, partly to land in other parts of the world, where there is more freedom, more life, more chance for individuality, even though work is just as hard or harder. The War will increase this tendency. Soldiers long for home now, and no wonder. "They'd be as pleased with me at home now as if I was a new kitten," said one of them recently. But they will be dull in the country after a bit. They will want to work in association, not alone. They will want hard, good brain work, something to grip, an absolute equality of mind with mind. Unless the country is to be different in the future from the country of the past, they will not stay.

Organisation after the War.—The country must create for itself a better civilization. This does not only mean that there must be surplus wealth to spend on something more than the bare necessities of a decent existence—though that is part of what is necessary. The power to organise the use of this surplus wealth is the other part. If it lacks this power the country is done, for organised industries and communities will always wrest surplus wealth from the unorganised. There will be plenty of this organisation all round the country. We shall have an era of organisation after the War that we have never yet known. Trades will be organised into trusts, international, impalpable, but very strong and extremely difficult to control. Very definite international action by Governments will be necessary if we are not to be the victims of these trusts, but that is another matter.

Against these organisations a country organisation which looks only to Westminster will, in my humble opinion, do little good. It could do very little in the best circumstances, and circumstances will not be of the best. The movement of self-help, the mutual aid given by men to each other, opens up infinitely more noble and inspiring vistas—and more profitable vistas. It is the co-operation of men to wring from Nature and Life the utmost they can give which is the organisation that inspires—and without inspiration organisation is nothing. All classes in the

until he has two things—a real interest in the land, and a surplus of wealth beyond his normal daily needs. Without them he will organise against the other interests of the country, and no amount of talking to him for his good will prevent it, for he is far too sensible. I do not know any single panacea for giving the worker these things—hardly even socialism. Allotments and small holdings—if there is far greater power of getting them—will help, and colony settlements, and profit-sharing on large farms, and a really free cottage, and the regulation of wages by the Wages Board. Only if these things and others are given, and abundantly, is there hope of a real organisation of a country civilization embracing all classes. But the organisation itself should depend on the co-operative society.

The Future of Agricultural Organisation.—The rural community must make it their steady, persistent and fundamental policy to work towards complete control over the manufacture and sale of all the produce of the countryside, its livestock, crops, by-products, and the manufacturing businesses connected with them. Societies now specialised should become general purpose societies. With whatever primary object a society is formed it should have its agricultural store, its credit and banking department, its small produce department, its land-renting or owning department. But there should be more than these forms of organisation for profit. The good society should go steadily and persistently from strength to strength. "*Nihil humanum alienum a me puto*" (there's nothing human that is not my job) should be its motto. Its most important department should be that of the public good. It should promote village and home industries so as to give interesting work for women. It should make our hedges bear fruit trees rather than thorns, and see that this and other communal property is respected. It should be able out of its profits, almost without feeling the burden, to build village halls and recreation rooms, to start libraries and reading rooms, to run a cinema—as the agricultural co-operative society at Enniscorthy in Ireland has lately done.

It should be a movement dealing with life itself and trying to create conditions in which a higher humanity will be possible. It should aim at creating a social order where the struggle for existence will give way to a brotherh[illegible]

Surely in this there will be an appeal even to our friends the big farmers. I have never thought that they could make very much for themselves out of agricultural organisation—financially. If they do without it they will still do well, and they can look after themselves. But by throwing themselves into the movement they can look after the community to which they belong, and this will give them far more of the best things that life can offer. Certainly in no sense will it be a narrowing, but rather a great broadening of their lives.

The Advantages of Agricultural Organisation.—I now come to the special application of my subject. Please concentrate on three points which I hope have emerged sufficiently, though I have touched some of them only in outline. (1) Agricultural organisation means saving in costs of production. (2) Agricultural organisation can guarantee the consumer the best article in the best condition. (3) Agricultural organisation contains the seeds of a better and fuller life for the country community. The general conclusion which I suggest is that an industry if run on these lines deserves the support of the community, if not, not.

Guaranteed Minimum Prices.—To come at length to the business in hand—what the farmer means by the support of the community is guaranteed minimum prices for his produce extending beyond the period of the Corn Production Act, and a revision of the Corn Production Act prices for grain in view of the increased cost of production. He is naturally very sensitive on these points, and very anxious. He wants the Government to commit itself, but the Government is thinking of many things Also, and I say this with complete conviction, the question does not depend on what any Government says, but on what the great mass of intelligent men and women in the country think. The farmer has to put his case in a way which will convince them of its justice. That is what matters. The farmer starts on his path of carrying conviction to the urban voter with some things in his favour, some against. In his favour the country has realised that he has worked very hard at food production under very difficult circumstances, and that if he had not we should have been far hungrier than we have been—we might even have lost the War. They realise that without the power of being self-supporting in an emergency we may be in a very tight place if another emergency arises. Our food supply is our weak spot. Also it is realised that graduated minimum prices are not the same as protection

All hope for protection for agriculture by duties is utterly vain. German submarines gave us enough protection in favour of home-grown food to last us a lifetime. There is no chance whatever of our seeing any system which would in any way artificially increase the cost of the food we buy, except for purposes of revenue. But guaranteed minimum prices to home growers are quite compatible with giving everyone their food at the world's lowest prices. Under that system the general taxpayer, in return for value received, makes up to the producer the difference between the price which he can obtain in the open market, and certain prices which are necessary in order that food production may be carried on in the way which the State demands. And if the great mass of town voters who will control Parliament succeeds in placing the great mass of the burden of post-war taxation on the shoulders of those better off than themselves, as seems very likely, they might view the finding of the money to guarantee certain prices to the producer with equanimity. On the other side of the account we must admit that there is a strong prejudice in the minds of masses of townsmen against the farmer and the landlord. To them the farmer is an arrant profiteer, the landlord a blood-sucker. As to the landlord, I claim confidently that no other class has suffered anything like the same diminution of income owing to the War. The way they have, in the main, gone steadily on without trying to increase rents, even to cover extra tithe and taxation, let alone to cover the increased cost of all the work they have to pay for on their estates, without thought of actually increasing their incomes, still less with any notion of trying to have the same real income in purchasing power as before the War, without even imagining that the War could bring them profit (as it has to so many other classes) fills me with amazement. Do you know how much of the calculation of *2s. 3d.* as the producers' price for milk represented rent? Not one townsman in a hundred would believe the answer, which is 0·44 of a penny, a tenth of a penny per quart, one per cent. on the retail price. As to the farmers profiteering, farmers in the main have not deliberately profiteered, though they have profited. But let us realise that when excessive claims have been put forward on behalf of farmers, as has unfortunately been done, untold harm is done to the interest of the whole agricultural community. They may get an extra pound a ton for their hay or potatoes now, but it is [illegible] dearly won. On balancing up pros and cons, however,

would listen to proposals to organise the agricultural industry on a better business basis, even if this organisation involved guaranteeing minimum prices, with patience and without prejudice, and this is something to start with.

My suggestion then is simply this: If guaranteed prices are to be asked for it should be only on a basis which will keep under cultivation an area necessary to make us self-supporting in an emergency, and will give to all engaged in agriculture fair profits *if they organise their industry in the completest and best way possible.* I do not go into questions of areas to-night. On that I accept the teaching of Sir Daniel Hall, confirmed, as it was, by the paper which Mr. Lennard read us a fortnight ago. It is the idea of calculating the prices on the basis of a thoroughly organised agriculture that I commend to your consideration.

If the urban consumer is to be expected to square up to the policy of permanently subsidising food production, the least he can ask is that all factors due to human backwardness or lack of enterprise shall be entirely eliminated in reckoning the bill which he may be called upon to pay. He will have to learn to make a very ample allowance for the changes and chances to which agriculture is exposed, which no human skill can guard against. The cutting of a field of corn may be turned by 24 hours' rain and wind from an operation costing 5*s.* to one costing 35*s.* an acre. Such weather as we have had in the North and North West this year may, indeed, prevent there being any harvest at all. All this must be allowed for. But further than this no one need go; and we may be pretty certain that under the terrific burden of taxation which we shall have after the war the community will not go. The present state of things will be a lesson, or should be. We have, for instance, recently had to fix milk prices. It was essential that there should be no reduction of the milk supply. What was it, therefore, necessary to do? We had to find out what was the cost of milk production in that district in Great Britain where it cost most, and give the producers there a reasonable profit. The producers there may not practise milk recording, they may keep bad bulls, there may be no co-operation in dealing with their supplies. No matter. We were at their mercy, and so we shall have milk this winter at 10*d.* a quart. That sort of thing is not good enough, and we ought not to be asked to repeat it.

The Need of Organisation.—It is fair, then, to ask the consumer

reasonably remunerative on a strictly business basis of organisation of the producing industry But the converse has to be considered. Is it fair to expect the farmer to organise his industry on this basis? I think so, now as never before. Farmers now have, or should have, more capital than they have ever had before. They have been in the past, in many instances, more or less in the hands of auctioneers and traders. If they have not got free, or cannot now get free, they deserve very little consideration. They are, in fact, free to make what they like of their industry. The War has, in many ways, taught them to combine. They only need to use their power of combination for the public good as well as for their own to have before them extremely bright prospects. There is also now, clear for all to see, a strong compelling force, though it is in the nature of a goad, and it would be so much pleasanter to lead than to drive. It is this: that unless farmers organise themselves from within in co-operative societies, they will be much less pleasantly organised from without by State officials. The fear of controllers and inspectors and orders may do what neither self-interest nor public spirit can accomplish. But if farmers refuse to organise, what then? The answer of the State will, I expect, be perfectly prompt. Let us take over, and let them give place to those who will. I do not personally think that land nationalisation is better than my ideal of a truly co-operative community working out its own salvation for itself, but there are many millions of people in England who do, and unless they see very great changes taking place in the organisation of agriculture very soon these numbers will steadily increase.

But you may say, "Why all this bother? There is not enough in agricultural co-operation to make much difference in calculating guaranteed prices." It may, in fact, be argued that the factors of climate, weather and soil count 90 per cent. or more in the price of agricultural produce, the difference between good organisation and bad only 10 per cent., or less. I do not know how this may be. That and many other things in the economics of agriculture badly want working out. I only know that when agricultural co-operation was started in Ireland fertilisers came down 50 per cent. When the Irish Agricultural Wholesale Society took to providing dairying machinery, prices dropped 20 per cent. And we have, fresh in our minds, the figures that Mr. Guy gave us of the avoidable elements in costs of agricultural implements.* But it is the

principle of the thing more than the amount that matters. If the whole organisation of the business is such as will give the consumer the best possible article at the lowest price he may fairly be asked to see that his food is produced on a basis which will first give the worker a living wage and a bit over for civilisation, then the farmer a reasonable margin of profit, and then the landowner a fair business return on the actual value of the work he does and of the equipment of the farm for which he has been responsible. The actual amount which the community saves by paying a price on a real business basis is a secondary matter.

The Future of Agricultural Prices.—There is one last point in regard to guaranteed prices that farmers should have in mind when they put forward their case. Guaranteeing a minimum price must carry with it the claim by the community to take produce at a maximum—not necessarily the same, but probably not very much higher. What world prices will be after the War we cannot tell. But if the State agrees to make farming remunerative, however low world prices may be, they will certainly expect the farmers to sell without any excessive remuneration if world prices are high. Remember that during the War the State has learnt to be a wholesaler on a gigantic scale, and in some ways not at all a bad one.

I can see that some of my friends among the farmers, if by this time I have any left, are looking pessimistic. I can imagine them saying " Its a gloomy outlook. We are to cultivate as if nothing depended on organisation. We are to organise as if nothing depended on cultivation. So peradventure *we may possibly win the chance of making a bare living from* England's future rulers." Cheer up, it will not be as bad as that. But even if it be, has not the War taught us that it does not much matter whether we make much money or little, provided that we have a steady hard job, worth working at, that we understand, and that we can work at it in association with men whom we know and trust, and who know and trust us? This, at any rate, is the least that agricultural co-operation has to offer, and I think that even on this basis the offer will not be made in vain.

I must append a story which some of us heard a few days ago A visitor had gone round an asylum and was much struck by the small number of attendants. " What," he said to the superintendent, " would happen if your inmates were to combine ? " " Oh," he replied, " that's all right, *lunatics* never combine."

AGRICULTURAL ORGANISATION.*

LESLIE SCOTT, K.C., M.P.

ENGLISH farmers have in the past troubled very little about agricultural organisation; but the future success of agriculture, from the point of view of both the farmer's pocket and the Nation's supply of good food at a reasonable price to the consuming population, will depend on the degree in which we succeed in organising the industry. Of all our agricultural questions, this one of organisation is, to my mind, by far the most important.

By "agricultural organisation" I mean the *business* organisation of the industry; an organisation by which the cost of production is reduced to a minimum; by which the selling of the farmers' produce is effected on the best business lines and at the lowest cost; by which the whole commercial side of agriculture is directed by the best commercial brains that money can procure, and no one is engaged in it who is not needed, and every one who is engaged is efficient; so that the industry shall not carry on its back any superfluous profit-takers. Under such a system the farmer can devote his whole time to the running of his farm and leave the buying and selling to men with commercial training who understand the job better than he does: but yet are so employed and paid that the farmer's interest is their interest. Every great manufacturing industry is organised to-day in this sort of way.

The Old Age.—To my thinking there are two features which stand out more clearly than any others in the picture of what British farming was before the War. (1) That the Nation took uncommonly little interest in it. To help the industry as a whole because the nation needed it never occurred to a British Government. (2) The complete freedom of the farmers and their independence of Government control.

How much was there of good and how much of bad in this state of affairs? Freedom is good; and I believe it to be absolutely essential to the welfare of this country, in the highest sense, that our farmers should remain a race of really free men earning their livelihood on their own farms, taking their own risk, and making their own profit. The preservation of their freedom is one of the first duties of statesmanship. But our

* Resumé of a Paper read before the Farmers' Club, 21st October, 1918. Reprints of the Address can be obtained from the Secretary, Agricultural Organisation Society, Queen Anne's Chambers, Tothill Street, S.W.1.

farmers have, perhaps, a little overdone the spirit of freedom. They were so independent in character that they insisted on being independent of each other, and were unwilling to enter into effective combination, so essential for business strength. Each farmer was like a Cyclops living alone on his own farm; suspicious of his neighbour; resenting help lest it should become interference; often unwilling to learn new methods, and usually contemptuous of new-fangled science. There is a temptation when we look back to the State's indifference and aloofness, in those far-off days before the War, to think of it almost as an elysium; but second thoughts remind us of the tragedy of the last two decades of the nineteenth century, when the low price of imported cereals, dictated by the competition of virgin soils and low ocean freights, made it impossible for the English arable farmer to meet the losses ordinarily incidental to bad seasons and ruined so many of them.

This is the other side of the medal, and freedom from State interference can be purchased at too high a price if it means that the industry cannot be carried on at a profit.

The New Age.—What, then, are the leading features of the new age? At present agriculture is in the limelight, and the public is watching every movement of the farmers. Why? Because the nation through the War has learnt what it was too stupid to understand before—*viz.*, that a productive agriculture is essential to its security, and, possibly, to its existence. The majority of the public see that we nearly lost the War through the German submarine, and that for the future we must be in a position to feed our population—or most of it—on home-grown food. In other words, the State from henceforth will regard itself as having a direct interest in agriculture. I believe that the days of State indifference have gone, never to return; that, whether we like it or not, farmers will never again get the complete freedom which they had before the War. State control in some measure has come to stay. Whether the kind and degree of that control will be tolerable or intolerable will depend on the farmers themselves. To make it tolerable two things are necessary: (1) That they should produce the amount of food the nation wants, of the kind it wants, at the price it wants; (2) That they should combine in an organisation which will be strong enough to insure that they are treated with justice and that the politician does not make impossible demands upon them. As I said before, the public has realised the importance of home production, but the great consuming population of the country does not as yet understand the

difficulties of the farmer nor the cost of production, nor does it care overmuch about his making a reasonable profit.

Another outstanding feature of the new age is to be found in the fact that leaders of commerce and industry have discovered the possibilities of good business both in farming and in farm products. Farmers, if they are not careful, may find their birthright taken from them. Capitalists are investing money in farming because they see that money is to be made by farming on big lines; in other words, by organisation. The small shopkeeper has in many trades been supplanted by the large multiple shop. Multiple farming has begun in this country on the same lines. A commercial company appoints a skilled manager and runs as one concern a number of separate farms, on each of which there is now just a foreman who was once an independent farmer.

Sir Daniel Hall has made us familiar with the idea of the very large 5,000 acre farm.* Of "commercial farms" of the sort it is well that we should have a few. It is one way whereby the farming of the country can be made more efficient. If it were the only way, economic pressure might force us to adopt it generally. But the drawback of it is that the nation would lose its race of independent farmers, who stand for so much that is strong and good in the fibre of our national character. And it is not the only way. I am convinced that by organisation on co-operative lines—*i.e.*, through agricultural co-operative societies—most of the advantages of the large commercial farm can be attained without sacrificing the independent farmer.

And the farmer's birthright is not only farming. Why should he lose all control of his produce at its very first stage—*viz.*, that of raw material? Why should he not follow it through its later stages till it reaches the consumer, and so share in the greatly augmented price that the consumer pays, and at the same time benefit the consumer by reducing the intermediate costs of manufacture and distribution, and letting him have his food at a lower price than before? The farmer grows the wheat. Why should not farmers join together and do their milling for themselves, and retain the offals of their own grain?

To-day they sell live stock to the amount (on pre-war figures) of over £50,000,000 a year. Why should they have no share

* An Article on the large farm as it might be organised on a commercial scale by women, was contributed to the issue of this *Journal* for October last (p. 789) by Sir A. D. Hall. See also *Agriculture After the War*, by Sir A. D.

in the fresh meat trade or in the valuable by-products of the slaughterhouse? Again, take milk. By a mere act of will the farmers of England and Wales who produce the milk could say, "We will do this business for ourselves." The man who controls the raw material controls the manufactured article. Every American manufacturer knew it long ago—and the Germans too. And now the war has taught it even to English manufacturers. Why don't farmers combine and take business charge of their own business—at least of their own wholesaling—even if they don't do the manufacturing or retailing? There is literally only one obstacle in the way, and that is their own unwillingness to improve their own business position. There is one certain road to success, and that is their own free decision to do it.

It is not only from the ordinary capitalist that the capitalist danger can be discerned. The small consumer has become a capitalist in these days, and he too is having a slice at your birthright. There are some 12,000,000 industrial co-operators. They are all consumers, and as consumers they are coming into agriculture. In the "Co-operative News" (which is the paper of the movement) for the 7th September last, it is stated that the Co-operative Wholesale Society—which has a huge capital—now owns 45,000 acres of land, including over 5,000 acres recently acquired, in regard to which they say that "the land will be used to develop a co-operative milk supply, and will constitute part of what we hope will ultimately be a huge system of co-operative dairy farms."

We may now sum up the chief features of the new age of British agriculture in one sentence. The State, the capitalists, and the consumers all have it in their mind to control the farming of the country. On the other hand, it is in the real interest of the nation that the farming class should be preserved as a distinct class in the community, and that they should continue as free men, and not become mere salaried bailiffs.

If you are to be kept alive—and in sound health—for the nation's benefit and your own, you must do two things:—(1) You must satisfy the State and the consumer by meeting the requirements of the population in regard to quantity, quality and price; (2) You must run your business efficiently, or it will be taken from you by the man of business. There is only one way in which you can do it, and that is by organisation.

What the Farmer would Gain by Organisation.—I have approached our subject from the point of view of the industry as a whole, because it is only by taking the big view and considering the general trend of the times that the absolute necessity for organisation becomes clear; and it is this argument which is likely to have most influence with the big farmer. He knows that as well as being an expert in production, he is no mean hand at the commercial side of farming; and he is naturally inclined to say, "What am I to gain by co-operation?"

My first answer is that he can gain by co-operation (which is only one form of business combination) just what every big concern gains by joining with other big concerns. The new combined whole is greater than any of the individual businesses, however big they were. Why have some twenty leading banks of the country recently amalgamated so that now there are only five? Not because the twenty banks were each of them inefficient; but because their efficiency, great as it was, is made greater still by combination. It is plainly to the interest of the biggest farmer to take the lead in the campaign for organisation upon which the salvation of British farming depends.

There is another argument, and one that will, I think, appeal to the big farmers even more—that the small man depends infinitely more than they do for his success in life upon effective organisation, and that the big farmers can render him invaluable help by throwing in their lot whole-heartedly with the cause of agricultural co-operation. No man who farms less than 300 acres can be called a big farmer, yet only three out of every hundred farmers in this country farm more than 300 acres; only thirteen farm more than 150 acres; and only half farm more than 50 acres. England, then, is a country of small farmers; Wales still more so, and the big farmers will, I feel sure, respond to my appeal, and extend the disinterested hand of help to all those small men.

There is a side issue, closely affected by our subject, which is very dear to the hearts of all of us, and that is the returning soldiers and sailors after the War. I was a member of the committee appointed to consider their settlement and employment on the land. The committee was unanimous in thinking that it was most important for the smallholder to belong to a good co-operative society, and doubly so if he came to his small holding without much previous experience. In order that they may learn something of their profession—for the life of a smallholder is both hard and difficult—they ought in the first instance, if possible, to be employed as labourers on the

farms; though the experience of inefficient labour which farmers have recently had will not make it very easy to get untrained men taken on. But the prospect of a small holding in later years and of making a reasonably good living out of it is a great incentive to hard work, and it will make these men learn their work on the farm much quicker and better if they can rely on getting in the future, when they pass on to a small holding of their own, all the help that a completely organised system of co-operative societies alone can ensure.

What Organisation means in Practice.—Having dealt with the general reasons in favour of organisation, I want to see now what it means in practice. Experience has proved that it is not much use attempting to transplant the particular kind of society that does well in a foreign country. In Denmark there is a vast number of small societies, each for one type of business. Here in England and Wales we have found that the kind which serves our needs best is the large society—covering a considerable area, and conducting more than one type of business.

There may be several sides to such a society's work. *Buying co-operatively for its members what they want and selling for them what they produce are the two chief ones.* Of these two, it is easier to begin with the buying side; and most of our successful societies have begun by the purchase for their members of farm requirements, such as fertilisers, feeding-stuffs, seeds, implements, and so on. As a general rule (and we need not trouble about the exceptions) there is nothing a farmer buys which cannot be bought better if bought through a co-operative society than bought by the farmer individually. The rule is of general application, and not confined in any way to a farmer's business. If you want to buy efficiently, you must go to the best sources of production. You can only do this if you can buy in sufficiently large quantities; and you can only get the best price if you are a customer whose custom means a very great deal to your seller.

One thing more. The man who buys for you must be a first-class buyer; and if you have to purchase different kinds of articles you must be able to command the services of a first-class buyer for each kind of article. If you are to employ different men for each class of requirements you must have enough trade to afford the salary of a good man in each line and to keep him continuously busy. For this purpose combination on co-operative lines can be made just as effective as combination on joint stock lines. It is obvious that a thousand

farmers bulking their purchases of fertilisers and placing one order can obtain better terms than any one of them could obtain by himself. This they can do by joining a co-operative society and employing a manager who understands the fertiliser trade.

You may say that whilst an average 1,000 farmers joined together in a farmers' trading society might afford one manager and a couple of sub-managers, they would not have enough business in each separate line—seeds, feeding-stuffs, fertilisers, machinery, etc.—to make it remunerative to employ an absolutely first-class man for each department. I agree. But assume that the society of 1,000 farmers joins with 99 other societies of 1,000 farmers each, so that we have 100,000 farmers in farmers' trading societies, if all these societies combine for the purposes of joint buying and run their own wholesale society, they can send to it the bulked orders of their various members; and the wholesale society, now having behind it this combined volume of trade, can easily afford to employ the very best men in each line, can command the very last discount from the manufacturers, and can import whole cargoes on the very lowest c.i.f. terms.

And if 100,000 farmers can thus join together and win such a commanding position, what is there to prevent the 423,718 farmers, returned in the last annual Board of Agriculture statistics as the total number of farmers in England and Wales, from joining together in the same way and thus controlling *every ton of the farmers' buying market in this country?* There is only one thing in the way, and that is the mental slowness of the British farmer to see his own interest, and I hope farmers will not be offended by my frankness. Farmers can command the position absolutely if they will only say the words "we will join together"—*and do it.*

Selling Co-operatively.—So much for the buying side. But though less has been done as yet by co-operative societies on the selling side, it is in the long run the more important of the two, for the reason I have already given, *viz.*, that it is only by concerted action that you can retain control of what you produce in any one of the later stages than that of the mere raw material—and in each stage there is as much money to be made as in the production of the raw material.

Direct profit is not the only gain. Supposing the bulk of the wheat crop were disposed of through your co-operative organisation, you would not only make sure that each farmer got from his own society the full price that the quality and

condition of his grain justified, but your wholesale society would make it a term of its sale to the millers that they should return the whole of the offals. You would thus kill two birds with one stone, selling your corn and making sure of your feeding stuffs, and the millers would know that if they were not reasonable the capital resources of the Farmers' Wholesale Society would enable you to start milling on your own account.

Up to date more has been done on the selling side in milk than in other produce—probably because the advantages of common collecting, cooling and selling are peculiarly obvious in the case of milk. This summer our dairy societies have been dealing with about 150,000 gal. of milk daily.

Fruit and market garden produce is another line where co-operative selling has made good progress for a similar reason, *viz.*, that everyone knows that fruit must be well graded and packed to sell well. Indeed, the Americans say that "a well-packed article has already sold itself!"

Poultry and egg-collecting and bacon-curing are other subjects of co-operative activity, and during the last twelve months we have started what I hope will develop into a very big thing—co-operative slaughterhouses. We have five of these in full work now. If the farmers will take it up, we can, with the help of our wholesale society, make a very, very big thing of it, and, after the war, fight every foreign meat trust successfully and sell to the consumer at the lowest price for British meat.

The Effect on Production.—The extension of the buying side of co-operative trade will make for better farming by ensuring a good quality of feeding-stuffs and fertilisers, for every society will see to the analysis. The level of farming, however, can be raised in other ways too. A State or county expert adviser is looked on a little bit askance by the ordinary farmer—probably because of a feeling that the official expert has no direct interest in the pecuniary results of his advice. If I, however, as a member of a co-operative society, voted for the employment of an expert by the society, I should at once feel that the man was my servant, and that my interest was his interest, and be glad enough to take his advice. Through the societies a much more intimate relationship could be set up with the agricultural education system of the county. Besides, in farming the lesson that really teaches is the object-lesson: seeing is believing when you see the difference before your eyes of a crop grown in the right way and one grown in the wrong way; inches and yield are convincing. So are the properly kept milk records of a

good dairy herd, properly managed. Why should not societies *arrange for demonstrations in cultivation, dairy records*, cost accounts, etc., on the farms of selected members in different parts of their district? It would solve the difficult and pressing problem of demonstration farms.

Agricultural Credit.—Another need of British farming can be met by co-operative organisation, and that is the supply of adequate working capital for the small man—the best manure for both grass and arable. The big farmer can get it from his bank easily enough; but the small man can't or won't. And yet the personal credit of the keen, hard-working small farmer who means to get on is about the best security in the world. If he will only buy his requirements from his society and undertake to use them on his farm, the society can advance him a loan at interest, and he can get his full bonus for a cash purchase, and his society is perfectly safe. This is the credit scheme which I put before the Agricultural Organisation Society, and they have adopted and Lord Selborne's Agricultural Policy Sub-Committee have approved in their report (Cd. 9079). We hope, with the help of the banks and our wholesale society, to get it into working order before 1919.

Labour-Saving Machinery.—Indeed, there is hardly any department of the industry where co-operative organisation would not bring advantages. Take, for instance, the question of labour. With present rates of wages, arable cultivation has gone up to between £3 and £5 per acre per annum. At this rate economy in labour is of the highest importance. The chief saving, I imagine, is to be looked for from labour-saving machinery. The small farmers of the country cannot own much of it, or, if they do, cannot give it remunerative employment because it will be lying idle too long. If they want it, they have got to hire it. Which will be the cheapest for them—to hire it from a contractor or for their own co-operative society to own it and hire it out to them? Why should not machinery, with expert labour attached, be regularly hired by the co-operative society to its members?

Improvement of Stock.—Or, take the question of livestock. Why should not the society own bulls, stallions, boars, etc., and hire out their services? The use of inferior bulls is a curse of British farming. We all know how much the milking herds of the country could be improved.

This is the general policy of the Agricultural Organisation Society. The membership of affiliated farmers' societies to-day is about 60,000, and of allotment societies about 70,000, and

the total turnover about £8,000,000 sterling: a small proportion of the whole, I agree, but still substantial and rapidly growing.

Right Kind of Society.—An agricultural co-operative society formed in the interest of all farmers of the district should embody the following principles in its rules:—

1. Membership should be confined to cultivators of land.
2. Capital should be found by the members.
3. Interest on capital should be limited to a reasonable rate, say 6 per cent.
4. The total issue of share capital should be unlimited, so that shares should not enhance in value.
5. Balance of profits should be distributed amongst the members in the form of a bonus on business done through the society.

A society on these lines can be registered for a sovereign and will not be subject to payment of income-tax. It is the only form of combination which will make certain of *all* the profits from combination accruing to those in whose interest the combination is formed.

I am not a believer in small societies as a rule. Efficiency is immensely promoted, in my opinion, by having a strong society covering a fairly large area, such as one or two counties, and combining all the various functions that I have referred to above. It is only by doing business in a fairly big way that the society can afford to have the best head manager and managers of departments, and do its work at the minimum of cost in proportion to turnover.

Agricultural co-operative societies do not, like joint stock companies, lay themselves out to make profits, as their main object is to supply their members with the best goods at the lowest price. They must, however, allow sufficient margin in their prices to cover trading contingencies, and the profits, if any, arising out of this margin are distributed in the form of bonuses.

The Agricultural Wholesale Society, which the Agricultural Organisation Society has helped to get into going order this year, is now in full swing so far as Government control over supplies permits it, at 48, Mark Lane, near the Corn Exchange. A reasonable scale of share capital for societies joining it has been agreed to (£1 per member plus 2 per cent. on turnover for farmers' societies and 1*s*. per member plus 2 per cent. on turnover for allotment societies), and as its usefulness becomes apparent I have little doubt that it will be easy to increase its capital.

The directors are elected by the societies, and there are sectional boards—farmers' trading, dairy and allotments, etc., elected by the societies in each section, so as to make sure that each department is directed by men with special knowledge, subject only to the control of the general board.

Agricultural Organisation Society.—The duties of the A.O.S. are to help the farmers, smallholders and allotment-holders of the country to form themselves into co-operative societies on sound lines, and to help these societies with expert advice in various ways and get them new members after they have been once started. The cordial relationship which has been established between the allotment-holders affiliated to the A.O.S.—and there are now about 70,000 of them—and the farmers is one of the best bits of work the A.O.S. has done for the future of agriculture in this country. The A.O.S. has been reorganised this year and put on a purely democratic basis. A great majority of its governors are now elected by the farmers' societies in the fifteen branch areas into which England and Wales has been divided; and each branch has been given a large measure of local autonomy under its local committees elected by the societies trading in the branch area.

In addition, the A.O.S. branch committees might act as local advisory boards for the A.W.S. if invited to do so. The whole movement is therefore now democratic. The farmers' organisation is run by the farmers for the farmers.

CO-OPERATION AND THE ORGANISATION OF THE DAIRY INDUSTRY.

Need for Home Production.—For some years previous to the outbreak of War, the imports of dairy produce into this country were rapidly declining, owing to certain of the exporting countries requiring increased supplies for their own use. In this connection comparisons between the imports of dairy produce from the United States and Canada during the years 1911 and 1913 respectively are instructive.

TABLE I.—CHEESE IMPORTS (cwt.).

	Canada.	*United States.*
1911	1,473,275	150,321
1912	1,352,570	21,227
1913	1,293,768	22,449

TABLE II.—BUTTER IMPORTS (cwt.).

	Canada.	*United States.*
1911	61,936	23,052
1912	27	2,596
1913	813	164

The diversion of merchant shipping to military purposes during the War has made this country even more than ever dependent upon home-manufactured dairy produce—a condition of things which is likely to be maintained if other countries continue to increase the competition against us for outside supplies, as may be expected.

The present situation affords a golden opportunity to the British farmer, which it is hoped he will seize, and, by organising his business, place himself in a position to assist in solving the problem of our nation's future food supply.

In order to do this to the best advantage it is necessary that the dairy industry should be thoroughly organised. This can be accomplished in two ways—(1) by private enterprise; (2) by farmers' co-operative dairy societies.

(1) **Private Dairy Companies** have long recognised the need for organisation, and have established milk depots, condenseries, cheese factories or creameries in localities which offered unusual prospects of good supplies of milk or cream. These companies have served a very useful purpose in the past, in providing up-to-date buildings and machinery for pasteurising and cooling milk, before despatching it to their town depot, or for making cheese, cream, butter, or condensed milk, whenever the milk was not required to meet the demands of their customers. In the

majority of cases, however, the farmer who is the producer of the milk does not receive any consideration beyond the purchase of his milk at the lowest possible price—the natural objects of the company being to swell the shareholders' dividends and to gain a trading supremacy over rival firms.

(2) **Co-operative Dairy Societies** of producers alone will enable a farmer to meet the requirements of the public on the same footing as his overseas competitors or the private dairy companies. The dairy farmer of the future must be prepared to meet the wishes of the public and to supply the consumer with a uniform quality of the highest possible standard in regular quantities. This he can only do by organising the dairying branch of his business on co-operative lines, by which means every farmer, however small, is afforded the same facilities as the largest dairy concerns for manufacturing and marketing his produce in accordance with the most approved methods. In addition to improving the quality and regularity of his output it should be remembered that once he becomes a co-operator, every member has a voice in directing the policy of his own society's factory, and instead of the surplus profits going to a few shareholders, they are refunded to him in proportion to the amount of milk supplied.

Need for Co-operative Effort.—The producer who sends milk direct to a town retailer is often not in a position to guarantee a regular supply, because in winter his cows will probably yield not more than half or even a third of summer quantities. The following table, showing the weekly amounts of milk sent away from two separate farms, illustrates this point clearly. It is taken from Dr. Stenhouse Williams' pamphlet dealing with the "Wastage of Milk."

Supply Mid-week in Month of	*Farm* I.	*Farm* II.
November, 1915	391	219
December, 1915	270	162
January, 1916	272	168
February, 1916	257	199
March, 1916	355	315
April, 1916	436	328
May, 1916	630	437
June, 1916	664	650
July, 1916	643	501
August, 1916	553	398
September, 1916	541	307
October, 1916	520	261
Contract quantities: Max.	595 gal. per week.	350 gal. per week.
Min.	301 ,, ,,	210 ,, ,,

Quite frequently this type of producer has no means of dealing satisfactorily with surplus milk, and the result is financial and food loss. He rarely has adequate means for properly cleansing and sterilizing the milk cans, which are often returned from his

customers in a sour and dirty condition, and if milk is returned n these improperly cleansed cans, he has to bear heavy losses through his milk going sour *en route*. He must also run the risk of making bad debts as well as having deductions made from his account through wastage in transit.

If, on the other hand, he makes butter on the farm, he is, n ordinary times, faced with a glut on his local market during the early summer months when the wholesale price falls to such an extent as to yield an insufficient return. At other times he has scarcely sufficient butter to meet his own domestic needs.

If he elects to make cheese at home, he may find it unprofitable to do so (compared with the co-operative factory system) unless he is in a fairly large way of business, and deals with sufficient milk to make it worth his while to purchase proper plant for the purpose. Having made his cheese, he must wait until it can be sold before he can get any return for his labour, and because he had only a comparatively small quantity to dispose of, he is limited to his own local market, and must needs sell at whatever price is prevailing there at the time of sale.

Advantages of Organising to Farmers.—When a farmer becomes a member of a co-operative dairy society the trouble of manufacturing and marketing his dairy produce is undertaken for him. Briefly summarised, some of the chief advantages which he gains by becoming a member of such a society are :—

(1) He is paid fortnightly or monthly for all the milk he delivers to the factory, and is therefore able to meet his obligations more regularly.

(2) Means are provided whereby his surplus milk is dealt with near the source of production, thus preventing the heavy losses which often occur when more milk is consigned to large towns than is required by the demand.

(3) If he is a small farmer he is provided with a means of obtaining to the same extent as up-to-date and efficient labour and machinery as the larger and wealthier farmer.

(4) The amount of labour required to deal with an equal quantity of milk is less. For example, 500 gals. of milk dealt with on 10 different farms would require 10 cheesemakers with 10 sets of apparatus, whilst in a factory the work could be done by one cheesemaker, with one assistant, and one rather larger plant.

(5) Having larger and more regular quantities of cheese for sale a greater choice of markets is available, and the society is not obliged to sell to any particular

buyer, as the farmer who has only his own small individual lot to offer often must do, no matter how low the price may be.

(6) When a factory has established a reputation for its cheese, buyers are anxious to take its produce at top prices, because it can be obtained more uniform in quantity, form and flavour, than when it is produced on separate farms.

The foregoing advantages refer mostly to those gained by membership of a wholesale milk depot or cheese factory, but in more recent years co-operation has been adapted to the distribution of milk in towns. That some organisation in this direction is needed will scarcely be denied. The familiar sight of several horses and milk carts, all selling milk in a short street at one and the same time is, on the face of it, not only unnecessary but a waste of time and effort.

The saving of labour by the adoption of this form of co-operation is enormous, and in those places where it has been adopted, as many as one-third of the original number of horses and vehicles employed in distribution have been taken off the streets through the organisation of the rounds. The chief advantages to a farmer through becoming a member of such a society may be described briefly as follows :—

(1) Farmers have only to deliver their milk at the depot of the society, having no further trouble or individual expense with it. Often the milk is collected at the farmer's door.

(2) The system allows the farmer more time to concentrate on his farming operations and thus increase his production.

(3) Milk is paid for at regular intervals without any deductions, if it is delivered in a saleable condition at the depot.

(4) Members are relieved from bad debts.

(5) The depot may provide a market for other produce, such as eggs, poultry and garden produce.

The social benefits to be derived from membership in a co-operative society must also not be overlooked. It often proves to be the first introduction which a farmer has to ordinary business routine, and his term of office on the committee of the society not only promotes a freer interchange of ideas with his fellow-members, but by introducing him to habits of system, inquiry, calculation, regularity and order makes him better able to carry on his own business successfully.

Advantages of Organisation to the Consumer and the Nation.—he advantages of co-operation are not on the side of the producer only. The nation as a whole and the consumer as an individual may reap certain benefits from its establishment.

Any expedient that will increase the supply of home-grown produce, eliminate waste, regulate supplies to meet fluctuating demands, improve the quality of produce,as well as standardise and stabilise such an important industry as dairying, should receive every encouragement and support.

It is claimed that co-operation can do all this, and do it in the least irritating and most efficacious manner. The following is a brief summary of the advantages derived by the consumer from co-operative organisation :—

(1) By ensuring a permanent market for his milk it induces the farmer to increase his production to the utmost yielding capacity of his farm.

(2) By paying for quality as well as quantity and the enforcement of stringent rules, a high standard of quality is maintained.

(3) By installing refrigerating machinery with brine cooler and cold storage accommodation milk can be supplied to be consumed in towns in such quantities and at such times as it may be required, thus balancing to some extent the ebb and flow in the supply and demand of the new milk trade. This treatment also eliminates losses due to souring and gives a more hygienic as well as a more regular milk supply.

(4) By converting surplus milk into cheese the nation's food supply benefits.

(5) By keeping pigs to consume the whey—either co-operatively near the factory, or on the farms of the members—a large amount of pork and bacon is added to the national larder. In 1915 one society alone fed pigs worth £3,000 with the help of whey produced from about 1,000 gal. of milk per day. Another society produces upwards of £60 worth of whey butter per annum.

In the past the neglect to put the by-products to their fullest use has resulted in huge losses to the nation.

Dr. Stenhouse Williams, of University College, Reading, in his pamphlet on the " Wastage of Milk," states that in two districts which he had under consideration, out of a total supply of 165,000,000 gal. of milk not less than 3,615,441 gal. were wasted, representing a loss of not less than 2 per cent. of the whole supply.

According to statistics collated by Mr. W. Gavin, and published in Supplement No. 16 to this *Journal*, the estimated total consumption of milk in England and Wales in 1914 was approximately 810,000,000 gal.

If we assume that only 1 per cent. of this total supply was lost through preventable causes, we could, by preventing the loss, have added to our resources to the extent of 72,321 cwt. of cheese.

The Growth of Co-operation.—Co-operative dairying has been practised in this and other countries for the past 40 or 50 years, so that it is a proved proposition and long past the experimental stage.

Just before the outbreak of war in 1914 Germany had no less than 3,588 co-operative dairies established. The dairying industry in Denmark, Finland, Canada, New Zealand and Australia is almost entirely organised on co-operative lines. In Ireland co-operative creameries have to a very large extent superseded privately-owned concerns.

Both privately-owned and co-operative creameries have of late years turned their attention to cheese-making in preference to butter-making.

As a result of enquiries which were made and propaganda undertaken by the Royal Agricultural Society of England the first co-operative factory was opened in the town of Derby in the year 1870. The first factory which was built especially for that purpose was opened at Longford, about 10 miles from Derby, in the same year. The object of running the two factories concurrently was to show whether co-operative organisation was suitable—or otherwise—under either town or country conditions. The results of this experiment were so satisfactory that farmers in other districts began to combine for the purpose of building and equipping their own co-operative cheese factories. The following factories still continue operations on lines very similar to those on which they were originated :—

Name of Factory.	*Date of Establishment.*
Hopedale	1874
Manifold Valley	1874
Grange Mill	1875
Pipegate	1876
Grafton	1884
Croxden	1885
Mayfield	1889

Derbyshire and parts of Staffordshire were practically the birthplace of co-operative dairying in England, whilst Cornwall, Yorkshire and Leicester followed their lead, although at a later

date. The adoption of co-operative cheese factories and milk depots in Wiltshire, Carmarthen, Northumberland, Dorset, Suffolk and Cheshire, took place at a still more recent date; whilst in North Wales, where small farms are the rule, the idea was not taken up until 1917, and then as a result of the working of co-operative cheese schools at Llangerniew, near Abergele, and Chwilog, near Pwllheli, in that year. Since then five or six dairy societies have been registered in the North Wales area.

The Agricultural Organisation Society was inaugurated in the year 1901 for the purpose of furthering the cause of agricultural co-operation, but it was not until 1912 that a dairy branch was formed for the special purpose of fostering the establishment of co-operative dairy societies. The following table shows the increase in the number of such societies from the year 1913 onwards, in England and Wales:—

Nature of Society.	1913.	1914.	1915.	1916.	1917.	1918.
Cheese factory and milk depots	20	25	30	30	31	49
Milk retailing	3	5	5	6	7	7
Butter-making	2	2	2	2	2	2
Butter-blending	1	1	1	1	1	1

These figures include registrations which have been put through up to 31st March in each year. Three new dairy societies have been registered between that date and 31st October, 1918.

In 1916 returns were made by 35 dairy societies, which had a total membership of 4,082 and a turnover of £993,163, or an average of £243 per member.

Co-operative Cheese Schools.—Realising the vital necessity for increased cheese production, not only as a war measure but by way of compensating for decreased importations, the Board of Agriculture decided, in conjunction with the Cornwall County Education authorities, to establish a co-operative cheese school at Lostwithiel during the cheese-making season of 1916.

The school was established for the purpose of demonstrating to the farmers, in their own locality and with their own milk, (1) that better returns could be obtained from cheese-making than from butter-making, (2) the advantages of the co-operative factory system, and (3) to give those students who desired it an opportunity of obtaining instruction in cheese-making under factory conditions.

For the purpose of the school the Board of Agriculture loaned the necessary cheese-making utensils, and the County Education Authority supplied an instructress to take charge of the

school. The local committee of suppliers made arrangements for the required supply of milk, a suitable building, hot water supplies, and such assistance as the instructress required. (See page 322 of this *Journal* for June, 1918).

The results of the working of the scheme at this school were most gratifying, and led the Board to extend the scheme to nine new centres during the following year.

The total number and the location of these schools up to date are given in the following list :—

Year.	*County.*	*Location.*	*Result.*
1916	Cornwall ..	Lostwithiel ..	Society registered.
1917	" ..	Gwinear Road ..	" "
"	" ..	Camelford	" "
"	Hereford ..	Bridge Sollers ..	" "
"	" ..	Wellington ..	" "
"	Cheshire ..	Haslington, nr. Crewe.	" "
"	Montgomery ..	Pool Quay	Milk sent to existing factory.
"	Wiltshire ..	Redlynch	Making cheese co-operatively, but *not* registered.
"	Denbigh ..	Llangerniew ..	Society registered.
"	Carnarvon ..	Chwilog	" "
1918	Cornwall ..	Tregony	——
"	" ..	Lewannick	——
"	" ..	St. Neots. ..	——
"	Berkshire ..	Marlston	——
"	Wiltshire ..	Minety	——
"	Hereford ..	Ledbury	——
"	" ..	Stoke Lacy ..	——
"	Montgomery ..	Caersws	Society registered.
"	" ..	Berriew	" "
"	Cheshire ..	Coppenhull ..	——
"	Denbigh ..	Llandyrnog ..	Society registered.
"	" ..	Llandegwyn ..	——
"	Flint	Nerquis	Society registered.
"	Carnarvon ..	Clynnog	——
"	Cumberland ..	Bridekirk	——
"	" ..	Newton Rigg ..	——
"	Isle of Anglesey	Ty Croes	——
"	" "	Llandegfan ..	——

Of the 18 cheese schools held this year four have already become registered societies and the remainder have the matter under consideration.

These Co-operative Cheese Schools form a suitable groundwork upon which to establish co-operative milk depots and cheese factories, and in order to give farmers every facility for the establishment of their own factories the Board of Agriculture, acting on the recommendation of the Astor Committee,* devised a scheme whereby newly-formed co-operative societies can be assisted in the matter of capital—provided that the factory is established in a district where, through lack of

organisation, the milk produced has not previously been available for human consumption A proportion of the capital can be borrowed on the basis of 6 per cent. interest, and is repayable in a definite term of years.

The work of organising depots under this scheme was placed with the Agricultural Organisation Society, under the direction of a joint committee made up of representatives of the Board of Agriculture and the Agricultural Organisation Society. The difficulties encountered in obtaining the necessary plant were very great, but in spite of this eight new depots have been established and others are in process of formation.

Influence of Co-operation in Increasing Milk and Cheese Production.—One of the most important results attending the formation of co-operative cheese schools and factories has been the increase of milk production in those districts where such schools or factories have been established. The following table shows the results in this direction in various districts :—

Name : *Sturminster Newton*, Dorset. Year established, 1911.

	1911.	1915.
No. of suppliers ..	97 ..	111
Total milk supplied ..	530,605 gal. ..	1,340,682 gal.

Name : *Vale of Towy*, Llandilo, S. Wales. Year established, 1912.

	1913.	1916.
No. of suppliers ..	*79 ..	27
Total milk supplied ..	115,607 gal. ..	109,355 gal.

* The cause for the decrease in the number of milk suppliers was due to restriction of area.

Name : *Llangerniew*, nr. Abergele. Year established, 1917.

	1917.	1918.
No. of suppliers ..	24 ..	26
Total milk supplied ..	20,702 gal. ..	38,000 gal.

Not only does the total amount of milk supplied to a factory increase, but owing to the satisfactory financial returns, the members of a society increase the number of cows kept. The following figures relate to the increase in the herds of six of the members of the Llangerniew Society :—

Farmer's Number.	*No. of Cows kept.* 1917.	*No. of Cows kept.* 1918.
1	5	11
2	14	25
3	2	3
4	8	14
5	3	5
6	5	10
Totals	37	68

The following particulars of the work done by the nine co-operative cheese schools during 1917 will serve to show what

Society.	*Milk Received.*	*Cheese Sold.*	*Value.* £	*s.*	*d.*
Camelford	30,309 gal.	32,000 lb.	2,018	11	10
Wall, Gwinear	33,693 ,,	35,300 ,,	2,203	8	7
Plas Du, Chwilog	12,117 ,,	14,368 ,,	891	17	10
Haslington, Crewe	9,388½ ,,	10,470 ,,	627	18	10
Llangerniew, Abergele ..	20,602 ,,	23,126 ,,	1,357	0	10
Pool Quay, Welshpool ..	10,487½ ,,	10,902 ,,	664	18	5
Wellington, Hereford ..	22,925 ,,	23,660 ,,	1,266	16	5
Bridge Sollers, Hereford ..	7,941¾ ,,	8,074 ,,	535	15	11
Redlynch, Wilts	10,056¾ ,,	10,441½ ,,	620	0	0
Totals..	157,520½ ,,	168,341½ ,,	10,186	8	8

In addition, 85 pupils received instruction in cheese-making on factory lines, some of whom found employment as cheese-makers in their own districts, whilst others went to factories that were opened up in other districts.

The establishment of these schools and factories has opened up a new industry in districts where hitherto the farmer has been obliged to continue butter-making—although he knew perfectly well that it was an uneconomical proposition—through the lack of facilities for cheese-making. The co-operative milk depot or cheese factory provides these facilities with a minimum of risk and a maximum of convenience to the farmer.

Persons *interested in the extension* of this development should write to the Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1, for Leaflets Nos. 75, 325, and A. 303/1, which will be supplied free of charge.

REPORT ON THE WORKING OF A CO-OPERATIVE CHEESE SCHOOL.

THE following report on the first co-operative cheese school held in Berkshire, namely, at Marlston, near Newbury, is an illustration of the beneficial results of co-operation.

The school was started primarily to demonstrate that cheese-making, on a co-operative basis, is a sound business undertaking; and, incidentally, to assist in the conservation of the national food supply.

The purposes of the school appear to have been attained in that (1) the moneys realised by the sale of cheese admitted of a satisfactory price per gallon being paid for milk supplied during the season; (2) milk, of which a large part was produced in the surplus season, was converted into cheese; (3) whey, a cheap pig food, was rendered available; and (4) a supply of cheese was made available to each supplier for the use of himself and his employees.

The school opened on 19th May, 1918, and closed on 30th September, 1918, thus working 19 weeks. In all, 12 farmers supplied milk, the total quantity being 228,092 lb. (22,145 gal.). The amount of milk received on the opening day was 1,158½ lb., and on the closing day, 1,456 lb. The highest quantity supplied on any one day was 2,448½ lb. and the lowest 920 lb., the average daily quantity being 1,627 lb.

The variety of cheese made was chiefly Cheddar, but a few Cheshires were also produced. From the 22,145 gal. of milk received, 22,932 lb. of cheese, weighed on the day of sale, were produced. Thus, taking an average over the whole period (19 weeks), one gal. of milk yielded 1·035 lb. of cheese. The cheese was sold for £1,879 7*s*. 3*d*.

The yield of whey was 18,173 gal., equivalent in amount to 82 per cent. of the milk received. The milk suppliers who took their quota of whey paid ½*d*. per gal. up to the week ending 6th July, after which the price was raised to 1*d*. This is not a high price, when it is remembered that 12 lb. of whey ($1\frac{1}{5}$ gal.) are equivalent for the purposes of pork production to 1 lb. of barley meal, and it is clearly reasonable, therefore, to claim

In the matter of remunerating the supplier for milk delivered, the practice followed was that each contributor was entitled to a share of the proceeds (after deducting working expenses) bearing a strict relationship to the proportion of the milk supply contributed by him, and the quality of his contribution. This amounted to paying him in two instalments, the first instalment being about two-thirds of the amount he expected eventually to realise, the actual amount being based on the quantity and quality of the supply. The system adopted was that for each 100 lb. of milk containing 3·5 per cent. of fat he received 100*d.*, and for each increase or decrease of 0·1 per cent. of fat in the milk, above or below 3·5 per cent. 2*d.* was added or deducted respectively.

At the close of the season, after the cheese had been sold, and the full working expenses ascertained, the balance of receipts over the expenditure became available for the payment of the second and final instalment to the milk suppliers, this balance being divided out amongst the contributors, again in proportion to the quantity and quality of the milk supplied by them.

The object of paying for milk on a quality basis is to encourage farmers to produce sound milk of maximum quality, as such milk is not only more valuable from the consumers' point of view, but also produces a higher yield of cheese. Thus, while 100 gal. of milk containing 3·5 per cent. of fat will produce approximately 95 lb. of cheese, the same amount of milk containing 3·7 per cent. of fat will yield approximately 100 lb. of cured cheese. Moreover, in the matter of co-operation, this system compensates the high-quality milk producer and penalises the low-quality producer, which, it must be agreed, is an equitable arrangement.

It must naturally be understood that the amounts which the various contributors received per gal. under the scheme varied, but the average price realised was 1*s.* 8*d.* per gal. This figure is, however, rather more than it would have been had the undertaking been a purely business concern instead of a school, in that certain expenses which would have arisen in ordinary circumstances did not occur. For instance, certain of the apparatus was loaned, and there was no charge for use of buildings and for secretarial services.

The following attempt is made, therefore, to arrive at a balance sheet truly representative of a purely commercial undertaking of the kind. In this balance sheet the cost of the milk is taken

					£	s.
19th May to 9th June	3,264·5 gal. at	1s.	..	..	163	4
10th June to 30th June	3,734	,, 1s. 4d.		..	248	18
1st July to 31st July	5,028	,, 1s. 6d.		..	377	2
1st Aug. to 31st Aug.	5,601	,, 1s. 7d.		..	443	8
1st Sept. to 30th Sept.	4,517·5	,, 1s. 7d.		..	357	12
	22,145·0		Total	..	£1,590	6

Equal to an average of 17·23*d.* per gal.

Receipts.	£	s.	d.	*Payments.*	£	s.	d.	£	s.
Cheese (actual) ..	1,879	7	3	Cost of milk used at current controlled prices				1,590	6
Whey (actual) ..	63	3	7	*Trade expenses*—					
Sundry small receipts (actual)	1	1	6	Rennet ..	13	3	0		
				Bandaging	20	15	1		
				Salt, soda, etc. ..	4	1	0		
				Sundries ..	1	17	7		
				Chemicals	1	16	1		
				(actual)				41	12
				Fuel and light (actual) ..				7	4
				Wages—					
				Instructress	50	0	0		
				Assistant ..	26	8	8		
				(actual)				76	8
				Rent, Rates, Taxes ..	4	16	7		
				Insurance	1	2	6		
				(estimated)				5	19
				Miscellaneous Expenses (actual)				6	17
				Depreciation on utensils purchased by the Committee and supplied by the Board (estimated) ..				9	0
				Gross Profits				206	4
	£1,943	12	4					£1,943	12

If this gross profit arrived at in the above balance sh is divided by the number of gallons of milk handled undertaking may be said to have returned 1s. 7½d. each gallon of milk used. It must be remembered, howev that the profit being gross makes no allowance for interest capital and general commercial risks, or for the yield cheese being slightly higher than usual in consequence sales being effected when the cheese was only three we old.

SUCCESSFUL DAIRY SOCIETIES.

IAN CALTHROP.

Dairy Organiser, Agricultural Organisation Society.

WHAT is a "successful" dairy society? Do we mean success from a purely commercial standpoint, or an increase in supplies from an area, or the mere existence of a large society with possibly a scattered membership? It is preferable to take a wider view, and claim as most "successful" the society working on strictly co-operative lines, with a membership comprising the bulk of the farmers in the district, and obtaining an increased milk supply from within that district.

Co-operative dairy societies claim to be performing on behalf of the State a duty both to the producer and the consumer. By increasing supplies, guaranteeing quality, preventing risk of souring, and encouraging direct sales from the organised producer to the organised retailer the societies are providing for the State a channel through which eventually may be drawn all the milk supplies of the nation.

We are as yet only at the commencement of the organisation of the dairying industry. It must not be forgotten that the despatch of milk by rail from the producing to the consuming areas was almost unheard of before 1870.

Unfortunately for both consumer and producer the control of the industry, owing to lack of foresight and effort on the farmers' part, passed almost immediately out of the possession of either party. The financier—a man without special interest either in production or the cost of living—stepped in and secured the control of prices at both ends. His main object, the keeping of consumer and producer apart, was frustrated by reason of his constant endeavour to obtain high returns on the share capital he invested. Gradually, the profits he obtained became known; and in increasing numbers the farmers started to try and do business, without the intervention of unnecessary people, between themselves and their customers. In some districts the wholesalers had, by means of a system of collection and provision of churns, secured an absolute monopoly; and the farmers were practically in the position of having no alternative market for their milk.

The work of the Agricultural Organisation Society in promoting the formation of farmers' co-operative dairy societies was slow to materialise; but the number of societies has

gradually increased, and the success of those formed has been remarkable. Fifty-eight societies, representing a turnover of about £3,000,000 per annum, are now engaged in handling milk.

As a similar type of work is done by most of these societies, and almost similar results are achieved in many places, perhaps the best plan is to describe a few of them, and suggest that those who are interested should go and see any one of these societies for themselves.

Amongst the most successful of the societies affiliated to the Agricultural Organisation Society may be mentioned the Wiltshire Farmers, Ltd., which has a turnover in milk alone of over a quarter of a million a year. The society has a finely equipped depot at Chippenham, at which the members' supplies are received. The milk is passed through cleansers and pasteurised, and is then cooled and despatched. The society, by means of an efficient system, has practically eliminated all wastage due to souring. Whereas the ordinary wastage throughout the country is about 1 per cent., the loss in the case of milk sold by the Wilts Farmers has been reduced to ·0004 per cent. The society has a membership of 1,200.

Another society, the Eastern Counties Dairy Farmers' Co-operative Society, Ltd., has a large depot in London, from which it regulates supplies. This society has a wonderful record as regards benefits both to producers and consumers. It has always paid a high price to the producer; and it has built up a large direct trade with the organised consumer. It now proposes also to retail milk.

The Ashbourne Milk Producers, formed only a year ago under the leadership of Captain Fitz-Herbert Wright, has been an immediate success. The milk is dealt with at depots situated around Ashbourne in such a manner that every farmer is within five miles of a depot. Milk is collected by means of the society's lorries, every member being thus saved the heavy expense of taking his milk considerable distances to a railway station. The advantage of this is obvious to those who know how hilly is the Peak district of Derbyshire. A large direct trade is done with industrial co-operative societies—a form of business which the society endeavours to encourage.

The special Board of Agriculture scheme for promoting the use for human consumption as "whole milk," of milk supplies which had previously been used for butter-making and calf-rearing on the farms, has led to a considerable increase in the milk resources of the country. The farmers, more especially

in Wales, have taken up the matter with great energy. Finding in the societies a ready market for all the milk they can supply, they have materially increased their herds; in some districts it is claimed that these have been doubled! The West Wales Society, which has taken in milk at three depots and has lately opened a fourth depot, is a case in point. Similar but smaller societies exist at Llangerniew and Chwilog.

Another illustration of the manner in which a co-operative dairy tends to increase production is found in the Brailsford Dairy Society. Wherever milk is dealt with through a depot, the question of the conversion of some portion of the supplies into cheese has at some period of the year to be considered. In normal times the Brailsford Society, which has a membership of about 50 farmers, makes a considerable amount of cheese, the by-products being returned to the members. It is stated that the starting of the society means that one small district has increased the value of the pig population by some thousands of pounds. Some societies skim the whey, the by-product mentioned, before handing it over to the farmer. One such society, the Croxden Association (one of the oldest in England), sells large quantities of whey butter every year.

The Wensleydale Pure Milk Society, as its name implies, makes a speciality of supplying milk of the very highest quality to certain towns in the North of England. The cows of the members are all tuberculin tested; and conditions as to feeding, milking, etc., are imposed to guarantee the production of milk of the very highest quality.

CO-OPERATIVE FARMERS: SOME PROSPEROUS SOCIETIES.

Supplied by the Agricultural Organisation Society.

"I AM more afraid of the vested prejudices than of the vested interests" said the Premier the other day; and the earlier advocates of economic combination among British farmers must often have had a similar feeling. Only quite recently, since the movement has attained a certain strength, have the vested interests begun to make their voice heard; the vested prejudice has given considerable trouble from the start. It was a formidable obstacle; and we are only now seeing it disappear under the action of that mightiest of solvents, experience.

There is an old English adage which contains a lot of wisdom, that an ounce of fact is worth a ton of theory. The farmers' co-operative movement in England and Wales is full of facts, and anyone can readily investigate them. Those who are interested should enquire at first hand, and visit the societies which embody and are carrying out the gospel of agricultural organisation.

Twenty-five years ago the British farmer had to be invited to look abroad if he would judge adequately the benefits which combination for business purposes might have for him; and he did not usually care to look abroad. It is anomalous that he should have had to do so for as long as he did, and that even now the Selborne Report should have to lament that farmers' co-operation in England and Wales is far less advanced than in most other civilised countries and all our great Dominions. Yet agricultural combination was born in these islands; and in Ireland it has achieved extraordinarily widespread results. In England and Wales the movement has progressed more slowly, but no less surely; and in less than 20 years from the start of the Agricultural Organisation Society this body has become the centre of a network of affiliated societies with a turnover of £8,000,000 annually, and a membership of about 130,000.

The prestige of the movement and its direct and indirect influence on agricultural thought have both grown most strikingly in the past five years; and despite the difficulties created by shortage of supplies and other adverse conditions of the war period, the majority of the societies were never in a more prosperous and active state.

Within the limits of a comparatively short article it is impossible to do more than indicate in brief paragraphs the nature and position of a few typical societies; but it should be emphasised that similar societies are scattered almost all over the country, and that the Agricultural Organisation Society will be happy to put farmers desirous of joining a society into touch with one or help them to start a local society.

Let us make a brief inspection of two typical though varied agricultural areas—those covered respectively by the North-Western Branch of the Agricultural Organisation Society (Lancs., Cheshire, Cumberland and Westmorland) and those within the Southern Branch (Wilts, Hants and Dorset). It is not suggested that the whole country is covered by societies as large or successful as the best of the societies in these areas;

in England and Wales would be eighty millions sterling annually instead of eight millions, and the membership of the movement, including farmers, smallholders, market gardeners, and allotment men, would be very near the million mark. By quoting these societies as instances of prosperous co-operative effort we seek to establish (1) that there is nothing in English or Welsh farming conditions necessarily opposed to the idea of co-operative combination; (2) that farmers here can combine as beneficially as in Denmark or New Zealand; and (3) that the principles expounded by the Agricultural Organisation Society are of universal application though it may be desirable to apply them on slightly different lines to suit the needs of particular neighbourhoods or forms of farming.

Mutual aid has proved beneficial in half the counties of England and Wales; and there is no reason why a movement which has brought the great advantages of real independence and enhanced stability, as well as economy of working and larger profits, to the farmers of Lancs. and Wilts should not confer equal benefits on the farmers, say of Northants and Lincolnshire.

The Preston and District Farmers' Trading Society, Ltd., is well-known among co-operative farmers as typical of the Agricultural Organisation Society movement at its best. The Agricultural Organisation Society has published a booklet on the history and work of this society; and every farmer who thinks of linking up with the movement—or has doubts about its value to the agricultural community—should read this booklet. It is a romance of co-operative development. Over £40,000 of the farmers' own capital is invested in this society, the membership of which has risen rapidly to nearly 1,000 last year (it was 208 in 1911). The last returns show sales of upwards of £360,000 per annum, the dividend being only 3*d*. in the £! This concern now has mills or depots at 13 centres. It is especially worth the attention of all students of the movement as a well-managed, progressive society, which combines in a high degree co-operative idealism and shrewd business acumen.

The Manchester and District Farmers' Co-operative Association is a society, formed more recently, which has grown up quickly and now occupies an important place in South Lancashire farming. Registered only in 1913, it has already over 500 members; and last year it sold upwards of £76,000 worth of goods. Lately, it has bought an important mill at

The Mid-Cheshire Farmers' Co-operative Society dates back to 1905; its expansion, however, has taken place most markedly in more recent years. Last year it had 418 members, and the sales were £62,840.

If examples are desired of societies established for a longer time and still going strongly—indeed more strongly than ever—the North-Western Branch area can supply several notable instances.

The Cheshire, Shropshire and North Wales Farmers' Supply Association, Ltd., is a case in point. The story of this remarkable society is told in the December issue of the *Agricultural Organisation Society's Notes and News*: it is a story of early struggle and eventual triumph over difficulties. The society was one of the pioneer farmers' organisations in the country, dating back to 1871. It has had only four chairmen and two managers since the beginning. In 1913, convinced of the necessity of building up a national co-operative farmers' movement, the old society affiliated to the Agricultural Organisation Society. Its success has been progressive. To-day it has 783 members, a turnover of close on a quarter of a million pounds annually (with capital of less than £20,000), and growing property and reserves. Since 1871 this society has returned to its members in bonus over £39,000!

In this same branch area the Furness and South Cumberland Supply Association, Ltd., was formed in 1880. It joined the Agricultural Organisation Society as lately as 1917 with a view to helping to consolidate the movement and because its management believed that the society would be helped by union with other similar societies. The Furness Association has had a chequered career; but it is now in a strong position with 384 members and a turnover of £37,696.

Another North Western society of note is the Lunesdale Farmers' Co-operative Creamery, at Barbon, which was registered in 1914 and only commenced work in 1915. It has 164 members and sold £25,412 worth of goods last year. Its establishment has enabled many small hill farmers to market their milk who were not in a position to do so previously; and, already well-founded, the Lunesdale Farmers' is assured of an increasing prosperity.

Turning from North to South, we find equally good evidence of co-operative progress among farmers. At the present time successful examples of practically every form of co-operative activity may be found within the Southern Bra

It is commonly said that co-operation offers no advantages or benefits to the large farmer, but the large farmers of Hampshire and the adjacent counties as long ago as 1907 decided that it was to their interests to combine, with the result that the Southern Counties Agricultural Trading Society was formed with headquarters at Winchester. The society started in a small way and had an uphill battle in the early days; but by the end of 1917 it had a membership of 546 (including several smaller societies), and its turnover had reached £540,856. The paid-up capital was only £2,726—and the net profit £10,000. All classes of agricultural trade are catered for; and there are separate departments dealing with the sale of requirements (*e.g.*, feeding stuffs, manure, seeds, etc.), the sale and hire of implements and machinery (including tractors), the sale of live and dead stock by auction, and the sale of eggs, poultry and corn.

The society has ample storage at Winchester and Southampton and supplies goods in hundredweights or truck loads. The auction department was started to bring down the commission charges of the local auctioneers, in which it was successful. Representatives attend the principal markets, and the society employs a skilled manager, machinery expert, and auctioneer.

The Wimborne and District Agricultural Co-operative Society affords a good example of a society catering for the smallholders aud small farmers—in addition to the large. This society started operations in 1916—to supply feeding stuffs, etc., for the smallholders and other farmers in the Wimborne district. Stores were secured in Wimborne, where large and small purchases could be made; and shortly after steps were taken to start a market for the sale of members' produce in Bournemouth. At the end of 1917, there were 263 members holding £979 in shares, and the turnover for the year amounted to £20,000—including the commission earned by the market. Recently, the auction department has been handed over to the County Fruit and Vegetable Society. Great benefits have resulted from the activities of the society.

Another form of produce, the handling of which affords testimony to the benefit of co-operative methods, is milk; and a brief description may be given of the Sturminster Newton and District Farmers' Society. In 1910 the dairy farmers of North Dorset were dissatisfied with the prices they were getting for their produce from the local buyers, and determined to erect their own factory. A great many difficulties had to be over-

;ome, and for some time the society was severely handicapped ɔy insufficient capital and supplies. A fully-equipped factory was built at Sturminster Newton, and although no profits were made for the first few years, prices were at once raised in the district. By 1917, however, the society was firmly established, with a membership of 262, of whom 199 sent milk to the depot. The turnover was £109,800. During the year 1,534,000 gal. were dealt with, 72,375 being made into cheese. Recently, another depot was taken over at Fortmell Magna, and a new one built at Gillingham. The society already does a small trade in feeding stuffs, which it hopes to develop in the near future. A large amount of the milk is collected from the members' farms by motor lorries, which are a great convenience. The activities of the depot have undoubtedly encouraged production in the district.

In the past—in many districts—farmers have been seriously inconvenienced by having to wait for privately owned thrashing and ploughing sets to come round. This state of things was aggravated by the War, with the result that the farmers of Hayling Island and the Isle of Wight decided to purchase and hire out their own tackle. Societies were formed in each place. In Hayling Island a steam engine and thrashing machine were purchased; in the Isle of Wight an engine and plough and cultivator. In each case the benefits have been very considerable. The work has been done early and when the farmers wanted it, and the charges have been much less than those of private contractors.

Before the War poultry keepers were in a great many cases dependent on the local market or higglers for disposing of their eggs and poultry, both of which frequently gave very poor returns. This resulted in poultry-keepers combining to sell their produce. As long ago as 1905 the poultry-keepers of West Dorset formed themselves into a society for the purpose of testing and grading eggs, and sending them away to the best market. From very small beginnings the Beaminster and District Collecting Depot has grown into a thoroughly sound concern. In 1917 there were 106 members—over £3,000 worth of eggs and poultry was sold— and in addition to paying interest on capital and full market prices throughout the year, the society was able to pay a bonus of 5 per cent. on all eggs and poultry sent in.

From the foregoing fragmentary notes on a few of the hundreds of flourishing societies affiliated to the Agricultural Organisation

Society it will be seen that there is a *primâ facie* case for enquiry by the farmer who has the progress of his class sincerely at heart, and who at the same time wishes to conduct his own buying and selling on the most up-to-date and economical lines.

Notes on Manures for January, 1919: *From the Rothamsted Experimental Station.*

THE termination of hostilities may be expected to ease the fertiliser situation in all directions, and the farmer may reasonably hope for better supplies in the forthcoming season than in the past. In particular, a certain quantity of nitrate of soda should soon be available and, although this substance is not needed at the moment, it is very valuable in spring time.

Basic Slag.—This is the season when the phosphatic requirements of grass land should be carefully worked out. It may be presumed that grazing land on heavy soil is likely to respond to basic slag: in many cases there will be available actual personal knowledge or direct experimental evidence obtained in similar circumstances. If not, it is desirable to enquire from the county expert whether or not slag would be likely to give a good return. If the land has already been slagged a repetition may be desirable after four or five years: if it has never been slagged a first application may well be overdue.

At Cockle Park satisfactory increases have been obtained from a first dressing of 10 cwt. of slag per acre, followed every third year by a dressing of 5 cwt. per acre. In the same experiment it was shown how much depends on the method of grazing, better results being obtained with sheep and cattle grazing together than with sheep alone. Thus, on the occasion of a recent visit to Hanging Leaves pasture field where mixed grazing is adopted, it was seen that the grass was well eaten down without leaving dry useless stalks that stock would not touch. On Tree field, however, where sheep only are grazed, the grass was not nearly so well eaten down, there being a good deal of stalky material not taken by the animals.

remarkable way in which slag gets rid of the coarse tussocky grass known as *Aira caespitosa* (identified by the ease with which the leaves cut one's fingers). After a dressing of slag finer grasses and clovers were observed to be coming up through the tussocks: in order to get at these the animals had started tearing the tussocks to pieces. In cases where slag can be obtained and is to be applied, there is something to be said for putting it on as early as possible, though not when the ground is covered with snow.

Perhaps the most important lesson from Cockle Park at the present juncture is that a good dressing of slag to the pasture is more profitable than the feeding of cake to the animals. Perhaps nothing in the whole realm of agriculture has been more frequently repeated in recent years than this, and yet so important is the result that it may well be re-stated. From this season's Report the following figures are extracted:—

Live Weight Increases in lb. per acre, over those on unmanured plot. Mixed Grazing, Cattle and Sheep, Hanging Leaves Field.

—	Plot 1. Basic Slag 10 cwt. 1903, 5 cwt. 1906, and every 3rd year thereafter.		Plot 2. Cake (3 cwt. Indian Cotton Cake annually per head) and Slag as Plot 1.		Plot 3. Cake alone (slag in 1903 only).		Plot 4. Basic Slag and Fish Meal.	
	Cattle.	Sheep	Cattle.	Sheep.	Cattle.	Sheep.	Cattle.	Sheep.
Averages of	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1904-5 (2 years)	111	40	150	57	144	60	109	44
1906-8 (3 years)	151½	54½	185	66	165	62	167	58
1909-11 (3 years)	116	71	136	77½	102½	59	113	74
1912-14 (3 years)	125½	64	144	66	108½	42	128	62½
1915-17 (3 years)	137	63	162	65	105	40½	120	59½
Results for 1917	131	48½	174	60	118	30½	118½	49
Average Annual Gain, 1915-17	48*s*. 11*d*.		18*s*. 3*d*.		loss of 2*s*. 5*d*.		30*s*. 6*d*.	

Sheep only grazed, Tree Field.

	Basic Slag. 10 cwt. 1897, 1906, and 1912. *Plot* 3.	*Cake.* *Plot* 1.
1897-1905	80	69½
1906-1911	94	91½
1912-1917	90½	97½
Average Annual Gain	27*s*. 5*d*.	loss of 11*s*. 9*d*.

Lime for Infertile Patches in Fields.—A number of cases of infertile patches in fields where certain crops persistently failed

have recently been brought to the notice of the Rothamsted Experimental Station. In many of these cases the trouble has been due to lack of lime. Two instances may be given. In the first lucerne was grown: it succeeded over part of the field, but failed in patches. Examination of the soil gave the following results:—

	Acidity Test.	*Percentage of Calcium Carbonate in Soil.*
Places where Lucerne failed ..	Acid	0·008
Places where Lucerne succeeded ..	Neutral	0·02

Here the lucerne succeeded on those parts of the field that were neutral, but it failed on the acid patches, and no amount of re-seeding or care in cultivation would keep it alive. The whole field is short of lime and very near danger point, but the barren patches have actually passed the danger point.

In the second case the crop was barley, and there again it succeeded over parts of the field, but failed in patches.

The analytical results of the soil were as follows:—

	Acidity Test.	*Percentage of Calcium Carbonate in Soil.*
Places where Barley failed ..	Acid	Nil.
Places where Barley succeeded ..	Neutral	0·016

Again, the barrenness is due to acidity, and can be remedied only by lime. Again also it may be said of the whole field that a dressing of lime would be a wise measure, and would certainly avoid future trouble.

So many cases have been met with where lime is needed that farmers are strongly urged to go into this matter as soon as possible.

Magnesian Limestone as a Source of Lime: Is it Safe?—Recently the use of magnesian limestone as a source of lime has been again discussed. In old days it was rather avoided by farmers, actual harm having been said to result from its use. Thus the Newcastle Farmers' Club allows no compensation for lime derived from magnesian limestone, though allowing it on an 8-years basis for ordinary lime. It cannot be said that there is much evidence of harm, although so persistent a charge can hardly be without foundation. So far as can be gathered, lime from magnesian limestone appears to answer satisfactorily on heavy soils, but is liable to cause trouble on light soils. More experimental work would be needed before a definite [illegible] stinction [illegible] dance to

Waste Lime.—Wherever waste lime can be obtained, it should be carefully considered by the farmer. Recent tests have shown that the residues from calcium carbide used to generate acetylene are perfectly safe for application, and constitute a useful source of lime to allotment holders and small consumers.* Those who can secure them will be well advised to do so. In the fresh state the lime is distinctly wet, but the excess of liquor rapidly drains away and the lime becomes more or less friable. It may be applied to allotment land at the rate of ½ cwt. per rod now, or within the next few weeks, and left exposed to rain or any frost that may come : later on, when it is broken up, it may be worked into the soil. If sufficient waste lime from any source is available for the farm it may be used in similar manner—put on at once, left to disintegrate in winter, and harrowed in in spring. A farmer purchasing waste lime, however, should always do so on analysis, as otherwise he may be paying more than would be asked for an equal quantity of fresh lime.

Are Dissolved Bones Worth Buying?—With the return of peace conditions this problem will again be before the agriculturist. Many farmers maintain a distinct preference for dissolved bones and are willing to pay more for them than for superphosphate. It is difficult to determine why this should be, as no experimental evidence exists to show any superiority worth paying for. In the Cockle Park tests dissolved bones have not come out as well as basic slag :—

	Dissolved Bones.	*Basic Slag.*
Yield of hay, cwt. per acre ..	23½ ..	40
Live weight increase in sheep over unmanured pasture, lb. per acre	59 ..	81·4
Average annual gain per acre ..	8*s.* 11*d.* ..	24*s.*

At Saxmundham poor meadow land has been manured with various phosphates, but again the bones have come out least effective :—

—	Average Weight of Hay: cwt. per acre.*	Total Cost of Treatment (12 years)	Net Profit due to Use of Manure for 11 years.
		£ *s.* *d.*	£ *s.* *d.*
Dissolved bones, 6 cwt., 1901 ..	24	5 0 0	13 4 10
Superphosphate, 7 cwt.	25	3 10 0	18 2 6
Basic slag, 10 cwt.	28	3 2 6	22 15 0
Unmanured	9½	—	—

The superphosphate and slag were each applied in 1901, 1907 and 1912.

At the Somerset centres the results of the manuring of swedes were :—

	Per Acre. Tons.	Per Acre. Cwt.
Dissolved bones (5 cwt.)	22	13¼
Superphosphate (5 cwt.)	23	5¼
Bone meal (5 cwt.)	21	1¾
Steamed bone flour (5 cwt.)	21	9½

These results do not show any superiority of dissolved bones over superphosphate, and in view of its higher price, farmers may well ask whether it is worth while buying them where superphosphate or slag can be obtained instead.

Distribution of Sittings of Eggs to Small Holders and Cottagers, 1917-18.*

THE results for 1917-18 of the working of the Scheme of the Board of Agriculture and Fisheries for the improvement of the poultry kept in the rural districts of England and Wales by the establishment of a limited number of stations for the distribution of sittings of eggs of pure-bred fowls have been very gratifying. Testimony as to the value of the scheme has been received from the county officials and station-holders, as well as from many small poultry keepers, for whom the scheme has been primarily drawn up. The period has offered a favourable opportunity for the encouragement of the raising of better stock, as on account of the shortage of poultry foodstuffs many keepers have been obliged to get rid of their less profitable birds and to breed only good quality stock. A large number of poultry keepers has thus come to rely upon the stations for renewing their small stocks.

The Stations.—The encouragement which has been shown to the stations throughout and the inspection exercised over them, as well as the industry shown by the station-holders, have added to their usefulness in assisting in the improvement of the quality of the stock raised. At a number of stations more sittings were applied for than could be supplied, and in many cases the supply was exhausted a few weeks after the commencement of distribution. A large number of station-holders would, in ordinary conditions, have been able to supply

more, however, but were obliged to cease distribution when the quantity required to be distributed in respect of the Grant allotted to them had been disposed of, on account of the low price fixed for the sittings. At a few stations the specified number of sittings was not applied for before 30th April. This seems to have been due to the lack of early publication of the arrangements by some county authorities, and the fear of a lack of sufficient foods and of a scarcity of brooding hens.

Very favourable reports have been received on the results of hatching, and in only a few cases have unfertile eggs been returned. The railway transport of eggs also appears to have been more satisfactory than in previous years.

The numbers of eggs offered to cottagers and smallholders in 1917 and 1918 was 252,000 and 108,000 respectively, and the actual number distributed in the latter year was 105,438.

The highest distribution in proportion to the Grant was made in the following counties :—

	No. of Stations.	No. of Sittings. Covered by Grant.	Distributed.
Warwick	2	120	161
Cardigan	1	120	152
Devon	8	480	586½
Denbigh..	3	180	214

Yorkshire, with 25 stations, distributed 1,476 sittings, only 24 short of the maximum covered by the Grant.

Distribution at a majority of the stations would have been greatly exceeded had not the market price of eggs remained higher than usual at the latter part of the season, leaving the station-holders no inducement to supply above the 60 sittings allowed for full premium.

The approximate average market prices throughout the county, and the prices under the Scheme were :—

	1917. Jan.	1917. April.	1918. Jan.	1918. April.
Market price	2/9	1/6	4/6	3/6
Price under scheme ..	2/6 (+6*d.* carriage).		3/6 (+6*d.* carriage).	

The lowest price wholesale in many of the counties served was reported by station-holders as 4*s.* per doz., and this only for a brief period.

As the price under the Scheme included charges for boxes, which during 1918 have risen in cost, and taking into account also the general charge of 8d. per sitting in respect of carriage by rail, this left an insufficient margin to allow for the additional work entailed in correspondence, packing and despatch of eggs

The following table shows the breeds offered and the approximate number of pens of each :—

White Wyandotte ..	102	Ancona	7
White Leghorn	102	Light Sussex	6
R. I. Red	35	White Orpington ..	3
Black Leghorn	20	Buff Wyandotte, Speckled Sussex and Black Orpington	2 each
Buff Rock	16	Brown Leghorn ..	1
Buff Orpington	15		

A considerable variation is shown in production. During the period the highest averages per pen of 12 birds per day were as follows :—

9·4 White Wyandotte and White Leghorn.
9·0 Ancona.

while the lowest were :—

2·4 White Leghorn.
2·8 " "

These records cannot be taken as a sure guide of either the quality or the management of the stock without comparison with the previous records, and no check can be kept upon the figures given, but they afford some indication of the way the work is being carried out.

Distribution from Incubating Stations, 1917–18.—The following figures give the quantities of eggs, chicks and stock birds distributed from incubating stations during the period under review :—

	Chicks.	*Eggs for Hatching.*	*Stock Birds.*
Anglesey	1,147	416	157
Lleweni, Denbigh	1,259	456	73
Kernock, Cornwall	912	72	78
Henhull, Cheshire	732	432	56
Total	4,050	1,376	364

Distribution of Day-old Chicks, 1917–18.—The scarcity of broody hens early in the season, due no doubt to the fact that better, and consequently less broody, laying-stock are kept, and also to the fact that a large percentage of the breeds now kept are of non-sitting variety, led to a greatly increased demand for day-old chicks, and by the middle of the season applications for four times the quantity arranged for had been received at the Harper-Adams College. The number of applications at the other three centres was not notified, but in all cases large numbers of orders had to be returned.

The following figures give the number of stations in existence in 1918, and the number of chickens offered (covered by Grant) and distributed during the year :

NUMBER OF EGGS SUPPLIED TO COTTAGERS AND SMALL-HOLDERS UNDER THE BOARD'S EGG DISTRIBUTION SCHEME, 1917–18.

Province and County.	*No. of Stations.*	*No. of Eggs Distributed.*	
1. *Four Northern Counties*—			
Cumberland / Westmorland	5	4,086	
Durham	4	3,012	
Northumberland	2	1,452—	8,550
2. *Yorkshire*	25	17,712—	17,712
3. *Midland Counties*—			
Derby	2	960	
Leicester	4	2,916	
Lincs. (Lindsey)	3	1,524	
Rutland	1	612—	6,012
4. *Eastern Counties*—			
Essex	4	3,168	
Hertford	1	768	
Lincs. (Kesteven)	4	2,916	
Norfolk	4	3,120	
Northampton	3	1,980	
East Suffolk	2	1,272—	13,224
5. *South Eastern Counties*—			
Kent	4	2,736	
Surrey	3	2,100	
East Sussex	3	2,172—	7,008
6. *Reading Province*—			
Berkshire	2	1,284	
Buckingham	1	252	
Dorset	2	1,158	
Hampshire	4	1,950	
Isle of Wight	1	432	
Oxford	4	2,484—	7,560
7. *Devon and Cornwall*—			
Cornwall	3	1,584	
Devon	8	7,041—	8,625
8. *West of England*—			
Gloucester	3	2,292	
Hereford	4	3,243	
Wiltshire	5	2,262	
Worcester	3	1,692—	9,489
9. *Harper-Adams Province*—			
Salop	2	1,308	
Stafford	6	4,548	
Warwick	2	1,932	
Cheshire	2	1,554—	9,342
10. *Aberystwyth Province*—			
Brecon	2	1,452	
Cardigan	2 (1 St. holder).	1,824	
Carmarthen	5	3,915	
Monmouth	1	747	
Pembroke	3	2,436	
Merioneth	1	180—	10,554
11. *Bangor Province*—			
Anglesey	4	1,566	
Denbigh	3	2,568	
Flint	2	1,620	
Carnarvon	3	1,608—	7,362
Total	152		105,438

DISTRIBUTION OF DAY-OLD CHICKS, 1917–18.

Name of Institution.		*No. of Chickens Distributed.*
Midland Agricultural and Dairy College	..	1,116
Harper-Adams Agricultural College ..	..	1,224
South-Eastern Agricultural College, Wye	..	822
Messrs. Eastman Bros., East Suffolk ..	..	775
Total ..	..	3,937

A Chamber of Horticulture.

SPEAKING at the inaugural meeting of the Chamber of Horti culture at the Caxton Hall, Westminster, on 2nd Decembe the Right Hon. R. E. Prothero, *Presiden of the Board of Agriculture,* said it was no the big man, but the small men who coul not help themselves who were going to benefit by such a Chamber. There were three special points to which he though they might give their attention. (1) The first was the questio of *horticultural research.* The history of the world and of th War had shown that, though we were bad starters, we were goo finishers. We had undoubtedly lagged behind other nation in scientific research in fruit growing, but the Board of Agri culture hoped that the endowment for research would be in creased and developed. If this were so, he did not doubt tha research work would be carried to such a pitch as would be a pattern to the whole world. (2) One of the objects of thei Chamber would be the *eradication and control of pests,* whic had hitherto done enormous damage. (3) Then there was th question of *railway transport.* They must unitedly put fort effort and show a good case for the increase of transport facili ties and the alteration of rates.

Soldier Labour on Farms during the War.

THE success of soldier labour on farms during the War is o happy augury in connection with the effort now to be made t place ex-Service men on farm work in thi country. If the low category men wh alone could be made available for agri culture during the War have proved thei worth, how much more valuable to farmers will be the labou of the fine fit men who will shortly be set free from the Forces.

In the early part of 1917 the Army Council agreed to supply for agricultural work, low category soldiers who were surplu to immediate military requirements. It was arranged tha such men should be posted to "Agricultural Companies" specially formed for the purpose and stationed at 43 convenien distribution centres. Each centre was placed under th

command of an officer with agricultural experience, and the distribution of the men to the farms was arranged by the County Agricultural Executive Committees.

The first men went out early in March, 1917, and their numbers have steadily grown until at the present time the agricultural companies contain over 70,000 men, apart from 10,500 other soldiers, who are temporarily attached for seasonal work. There is, therefore, on farm work one soldier to every nine civilian male workers.

From the outset it was recognised that two inherent difficulties had to be faced. First, the majority of the men available had no previous experience of agriculture, and secondly, many of them, having been used to town life, would find the conditions of country life unattractive. Farmers, therefore, had to be encouraged to teach the untrained men and make the best of them. It was also necessary to make the men as comfortable as possible.

As a general rule, both farmers and soldiers quickly adapted themselves to the new conditions. Employers who at first sent back men because of their ignorance of farm work, soon heard from other farmers in the district that the unskilled men were, under patient teaching, rapidly becoming useful farm hands. The County Labour Officers and the Commandants of the Distribution Centres attended markets and farmers' meetings, and persuaded employers who were short of labour to give the men a trial. Farmers were also encouraged to visit the centres and interview the men there. On the other hand, Commandants were quick to " spot " men who were never likely to be satisfactory on farms and these were sent back to their units.

Many thousands of soldiers were taken on by farmers and trained, being paid the local agricultural wage from the commencement. Later on, when the programme for the 1918 harvest was being seriously retarded by reason of the deficiency of ploughmen, it was decided to send out soldiers free of charge for two to three weeks to selected farms to be trained as ploughmen by the farmers' skilled men. The Food Production Department also established some 30 ploughing schools in the neighbourhood of distribution centres, at which unskilled men could be taught to plough. A three weeks' course of tuition proved on the average sufficient, and over 4,000 ploughmen were trained in this way. To the school near Bishopthorpe, York, managed by the West Riding Agricultural Executive Committee, 481 men in all were sent to be trained, and of these,

431 were passed out as ploughmen, only 50 proving to be unsuitable. The majority of the men trained were van-drivers or carters from towns, while others had been farm labourers not accustomed to horses, and many had had no previous experience of farm work or of horse management.

Other schools were established by the Department for the training of soldiers as tractor drivers and ploughmen. The men selected were mainly those who had been used to driving motor cars or had some knowledge of petrol engines. After two weeks' course at the school, followed by two weeks in the field as third man, the men were usually found to be sufficiently proficient to take charge of a tractor. In all, 4,093 soldiers were trained for this work. About 200 soldiers were also sent out for training with steam plough and threshing sets.

Apart from the low category men posted to Agricultural Companies, farmers have received invaluable assistance by the loan of both skilled and unskilled men from the Army for short periods at busy seasons. In the spring of 1917, 18,000 category "A" ploughmen were sent out for two months to assist with spring cultivations. Similarly, 1,500 ploughmen were loaned for three months during the autumn of 1917; and 7,500 such men are on farm furlough at the present time. Reliance has also been placed on soldier labour for the ingathering of the harvests. 17,000 men assisted farmers to secure the harvest of 1917; and 8,500 were sent out this year, in addition to the regular soldier workers. Soldiers from Convalescent Camps and Command Depots have also assisted in harvest work. In both years much laid corn had to be harvested, and hundreds of soldiers were taught to use the scythe or sickle. The plan adopted was to arrange with farmers who had laid crops in the neighbourhood of the centres to allow their corn to be cut by hand by unskilled soldiers working under the supervision of the farmers' skilled men. It was found that men of average intelligence could be taught this work in one or two days.

Latterly, the Agricultural Companies, having reached their full authorised strength, have been reinforced only by soldiers with agricultural experience. The men originally sent out as purely unskilled have settled down as part of the permanent staffs of the farms and in numerous instances are among the farmers' most valued men. Numbers of these men will undoubtedly decide to remain on the land permanently rather than return to their former town occupations. Many will desire to climb the agricultural ladder and attain to holdings

Protection of Seed Grain from Birds.

THE Board have received the following communication from Dr. W. E. Collinge: With reference to the notes on the protection of seed grain from birds at pp. 927 and 1021 of the November issue of the *Journal*, the writer, some years ago, made a large number of experiments on this subject with powdered aloes, alum, creolin, cresylic acid, coal tar, and various waste tar products.

None of these alone gave complete protection, and some certainly retarded germination, particularly the cresylic acid, but the two following mixtures proved exceedingly effective, and are, we think, worthy of being recorded.

1. This consisted of ordinary coal tar melted down and thinned with a mixture of paraffin, and a little liquid soft soap, until the desired consistency was obtained.

2. In the second case, ordinary commercial cresylic acid mixed with an equal part of paraffin formed the thinning material. This was well mixed with the melted coal tar, and then an equal bulk of what is termed at the tar distilleries "heavy base oil" was added.

This latter mixture dries much quicker than the former one, and proved the more effective of the two.

No adverse effect was noted on the germination of the seed in either case, whilst the seeds were certainly avoided by rooks, starlings, and wood pigeons.

Successful Farm Cropping.

THE Board have received from Mr. W. Brunton, of Tollesby Farm, Marton, Yorkshire, an interesting communication, giving particulars of the high yields obtained from two years' cropping of a field of 17¼ acres. The field was measured for the previous tenant's away-going crop 2 years ago, when it was in oats after "seeds." It had received 10 tons of manure per acre, and the oats were valued to Mr. Brunton at 7 qr. Mr. Brunton manured it again with about the same quantity of farmyard manure and ploughed it in in the autumn. During the winter he gave it 10 cwt. of basic slag, and in the spring (1917) 5 cwt. superphosphate and 2 cwt. bone meal in the rows for swedes, which were only half a crop. This year it was sown with Goldthorpe barley, and gave the high yield of 165 qr. (=76½ bush. per acre) of malting barley + 5 qr. of small barley. Mr. Brunton thinks that the application of basic slag to the turnips

State Control of Potatoes. Fixing of Prices and Trading Conditions.*

In accordance with an announcement made at the beginning of the present year, the Food Controller on 1st November took control of the whole potato crop of England and Wales.

The prices to be paid to growers have been fixed by a Commission, under the chairmanship of Mr. Rigby Swift, K.C., M.P., appointed by the Food Controller and the President of the Board of Agriculture jointly. The report of this Commission has just been issued.†

The prices per ton, free on rail, during November and December for Grade 1 potatoes (" King Edward," " Golden Wonder," " Langworthy," " What's Wanted," and " Main Crop " varieties) are as follows :—

	£	s.
Sussex	8	0
Wilts, Hants, Berks, Bucks and Oxford	7	10
Kent, Surrey, Essex, Herts, Beds, Middlesex, Dorset, Somerset, Gloucester, Devon, Cornwall, Suffolk, Lancaster, Cheshire, Monmouth, Wales	7	0
Hereford, Worcester, Warwick, Shropshire, Stafford, Derby, Leicester, Northants, Rutland, Northumberland, Cumberland, Westmorland, Durham	6	15
Nottingham, Yorkshire, and other than black lands in Lincolnshire, Soke of Peterborough, Norfolk, Cambridge, and Hunts	6	10
Black lands in Soke of Peterborough, Lincolnshire and Norfolk	6	0
Black lands in Cambridge and Hunts	5	15

Prices for Grade 2 potatoes (which include all other varieties than those mentioned above) are in all cases 10*s*. less.

While the prices to producers will thus vary in different areas, the price to the public for the same grade of potato will be uniform throughout England and Wales. Grade 1 potatoes will, until the end of December, be retailed at a uniform price of 1¼*d*. per lb., and Grade 2 at a uniform price of 1d. per lb. Lower prices will be fixed for large retail sales. In January the retail prices will be raised to 1¼*d*. per lb. for Grade 2 and 1½*d*. per lb. for Grade 1 potatoes.

The potatoes will be supplied to retailers at a uniform price fixed conditionally at £9 per ton for Grade 1 potatoes and at £7 per ton for Grade 2 potatoes ; the price being reckoned to the retailer's nearest railway station.

The wholesalers will thus buy from the growers at varying prices, and sell in all cases to retailers at a flat price. In doing so, they will act as agents *of the Ministry of Food* at a commission which has been fixed, provisionally, at 7*s*. 6*d*. per ton, and they will account to the Ministry for the difference between the price paid to the grower and the price obtainable from the retailer after deducting their commission and necessary charges.

Both the retailer's buying price and the wholesaler's commission are subject to revision when further information as to actual costs has been obtained.

Method of Distribution.—For purposes of administration, England and Wales have been divided into eleven deficit zones, which will need

* See also this *Journal*, Se

at some time or other during the year to import potatoes from elsewhere, and twelve surplus zones, which will export potatoes (particularly to London and the other large industrial centres). In each surplus zone is a zonal committee under a zonal chairman, responsible for organising the collection of potatoes for export to other areas. In each deficit zone is a Potato Control Committee under the chairmanship of the Food Commissioner. These committees will be empowered to issue directions relating to the collection and disposal of potatoes—*e.g.*, they may require potatoes of good keeping qualities to be held up until later in the year.*

Subject to any restrictions imposed by the Potato Control Committee or the zonal committee, growers will be permitted to sell potatoes to any registered wholesale dealer in their zone; but they may not sell to anyone else, except under licence to be obtained from the Food Commissioner of their area. Sales under such licences will be made at the appropriate price for the class of sale authorised, but growers of more than five acres will be required, as a condition of obtaining such a licence, to pay a fee so adjusted as to secure that their net receipts are equivalent to the grower's price fixed for their district, together with any sum required to cover the cost of additional cartage and a commission of 2*s.* 6*d.* per ton. Growers of less than five acres of potatoes will not, as a rule, be required to pay this fee.

Till the end of December growers may, without licence, sell Grade 2 potatoes grown in the counties of Sussex, Wilts, Hants, Berks, Bucks and Oxford, direct to retailers or consumers within their zone.

Small growers who have cultivated less than one acre of potatoes altogether in 1918 may sell freely without any licences, subject to the maximum price applicable.

A grower selling to a wholesale dealer will be entitled to receive the assessed price within fourteen days, and if he does not do so should apply to the Potato Control Committee or zonal committee of his zone, as the case may be.

No person may deal in potatoes by wholesale unless registered by the Ministry of Food, or by retail unless registered by the Food Control Committee of his district.

Wholesaler's Commission.—As a general rule, only one wholesaler's commission may be charged in respect of any lot of potatoes; and if they pass through the hands of more wholesalers than one the commission must be shared. Special cases will, however, be considered, and an additional collecting dealer's commission, not exceeding 3*s.* 6*d.* per ton, may on application for the necessary licence be allowed in cases of proved necessity.

Wholesale dealers will not be allowed to sell potatoes to any person other than registered retailers or wholesalers, unless they hold licences to do so from the Food Commissioner of their area. Such licences will be granted to wholesale dealers who can show that they have a regular trade in supplying potatoes to caterers, fish-friers, institutions, or other large consumers, and will be limited to sales of potatoes to specific customers.

The general system of control and the retail prices fixed under it will come into force on 1st November; but retailers will be allowed,

until and including 9th November, to sell any grade of potatoes at a price not exceeding $1\frac{1}{4}d.$ per lb. if it is proved that such potatoes were bought from the grower before 1st November.

A leaflet for the guidance of retailers, giving the zones and the addresses of the committees and Food Commissioners, can be obtained on application to any Food Office. Leaflets for growers and for wholesale dealers can be obtained from the Ministry of Food, or from any Food Commissioner or zonal committee. All applications for licences should be made to the Food Commissioner for the district.

The foregoing summary relates only to ware potatoes. Growers will be free to sell undersized potatoes subject to a maximum price of £3 10s. per ton free on rail. Undersized potatoes for which a market cannot be found in the ordinary way will be taken over by the Ministry of Food at the fixed price of £5 per ton prescribed by the Joint Commission.

A separate Order will be issued dealing with seed potatoes. (*National Food Journal*, 13*th November*, 1918.)

THE following is the report of the Potatoes (Growers' Prices) Commission, presented to the Food Controller and the President of the Board of Agriculture :—

Report of the Potatoes Commission. Method of Assessment by Areas.

We have conceived it to be our duty so to fix the prices that they should be such as would, having due regard to the average cost of production and yield per acre in the different districts, give to the grower a fair profit ; at the same time we have endeavoured to fix such prices as, having regard to all the circumstances of the present time, shall be just to the consumer.

We have devoted one day in each of the fifteen districts selected by your departments to hearing local evidence submitted by representative merchants and growers. Wherever our meetings and itinerary allowed, we have inspected typical potato crops in the areas. Since our return from the country we have heard a number of representative witnesses on matters relating to costs of production, an equitable scale of profits on cost, estimated yields, the incidence of the various potato diseases throughout England and Wales, and other points germane to our inquiry. By the courtesy of the Director-General of the Food Production Department, we have availed ourselves of the services of several of his technical officers, who have lifted samples of growing crops on farms selected by us for the purpose in order that we might check the accuracy of estimated yields given in evidence. Since our labours began on 29th July we have held altogether 31 sittings, have heard 31 assessors, and have examined 102 witnesses.

The evidence laid before us in the areas was, we understand, prepared in the following manner. Before the sittings of the Commission began, a form of schedule of costs of production was prepared at the Food Production Department and settled in consultation with the assessors appointed by the Board of Agriculture. This form, with or without emendations made to suit local methods of calculating costs, was circulated by the Board's assessors to a large number of representative growers and filled in by them. These forms were in turn tabulated by the Board's assessors, who in most cases presented to us, at our local sittings, average costs of production covering a part of a cou

estimate of the yield. In many cases the assessor appointed by the Ministry of Food presented similar evidence collected from growers, or alternatively made a report based on his own observations and experience with or without consultation with the Board's assessor. In some cases the assessors agreed on an identical cost of production and yield; in others there was a difference, but in no case was it greatly marked.

Costs of Production.—We were everywhere impressed by the general ignorance of growers as to their costs of production. It is obvious that, in the majority of cases, farmers had never before considered the question except in the vaguest way, with the natural result that the most divergent views were expressed on this essential element of our inquiry. We feel sure that the costs as presented to us were on the whole exaggerated, not from any intention to deceive the Commission, but owing to a general tendency to attribute to all potato growers in an area the advanced kind of husbandry exercised only by the most enlightened few. This was clearly demonstrated where, on our instructions, test weighings were made of the crops on the farms taken as representative by the assessors.

We desire to express our gratitude to the assessors for the considerable time and trouble expended by them in an inquiry of a novel and difficult character.

In many cases the assessors and witnesses asked for special consideration for those farmers who had not previously grown potatoes but had cultivated a considerable acreage this year either voluntarily, from patriotic motives, or at the direct request of the County Agricultural Executive Committee. The increase in the area planted has been taken into account by us in fixing the schedules of prices, but any attempt to compensate individual farmers whose crops have been a partial failure owing to unskilled cultivation or similar causes would cause serious hardship to the consumer, and would give excessive profits to the average grower. We are confident that the motives of the farmers concerned were genuinely patriotic, and that the majority will expect no compensation beyond the prices we have fixed, other than the knowledge that they loyally responded to the appeal made by the Government at a time of national crisis.

The Prices.—It will be observed that the prices given in the schedules hereto vary between an average price of £6 3*s.* 2*d.* per ton, for ordinary varieties over a $1\frac{3}{8}$-in. riddle for potatoes grown on black land in Cambridgeshire, to £8 18*s.* 9*d.* per ton, for "King Edwards" over a $1\frac{1}{2}$-in. riddle for potatoes grown in the county of Sussex.

In accordance with the instruction contained in your Warrant, we have given careful consideration to the proposed classification by the Ministry of Food of ware potatoes into one or more grades for the purpose of retail sale. Our decision that an extra price of 10*s.* per ton shall be paid to growers in all areas and at all periods throughout the season for potatoes of the varieties "King Edward" and the "Langworthy" group was based on the following reasons:—

(*a*) The yield per acre of these varieties is on the average markedly less than of the ordinary white varieties.

(*b*) These varieties in the past have secured a readier sale and better prices than other varieties.

(*c*) Growers this year have planted these varieties expecting that, as usual, the higher price would at [illegible]

We trust that this decision will not be regarded by growers as maintaining a precedent for future years, or as a reason for concentrating their attention on the production of "King Edwards." It may be desirable that a certain proportion of this variety should be grown on account of the excellent keeping qualities of the tubers, and because they can be lifted comparatively early; but we consider that the relatively low yield per acre and the liability to disease make the extensive cultivation of the variety undesirable, except on certain classes of soil. We do not think that any encouragement to the growing of "King Edwards" should be derived from the fact that we have, in the circumstances prevailing this year, fixed a higher price for them.

It will be observed that there is a variation as between different areas in the size of the riddle over which ware shall be sold. Practically unanimous evidence was laid before us that the use of southern "seed" is neither usual nor desirable, and the dressing of ware over a 1½-in. riddle in these areas will have the twofold result of yielding a larger proportion of the crop for human consumption in areas which normally import a substantial part of their supplies, and of preventing the planting in 1919 of unsuitable "seed." Moreover, we have evidence that in many of these areas it has been the practice to sort the potatoes by hand, instead of dressing them over a riddle, and that such ware normally corresponded with samples dressed over a riddle with a smaller mesh than 1⅝-in.—(*National Food Journal*, 13th November, 1918.)

Footnote 1, to Schedule of Grade I. Potatoes on p. 1119 :—

The increments fixed above must be accepted as covering compensation to the grower for wastage and loss in pits, and for deferred delivery. Price, weight and condition are to be determined in accordance with the scales set out above as to the date when delivery is taken. No grower is entitled to claim further compensation for any losses, save those which are quite exceptional in character. In such cases it will be the duty of the grower, when making application for compensation, to satisfy the Government that :—

(1) The site of the pit has been properly chosen ;
(2) The potatoes were in sound condition when pitted ; and
(3) Due care was exercised in constructing the pits and in examining the condition of their contents from time to time.

If the Food Controller should decide to take all ware potatoes over a 1⅝ in. riddle in all or any of the areas for which a 1½ in. riddle is specified above, the prices for all periods are to be increased by 10*s*. per ton.

Footnote 2, to Schedule of Grade II. Potatoes on p. 1120 :—

The increments fixed above must be accepted as covering compensation to the grower for wastage and loss in pits, and for deferred delivery. Price, weight and condition are to be determined in accordance with the scales set out above as at the date when delivery is taken. No grower is entitled to claim further compensation for any losses, save those which are quite exceptional in character. In such cases it will be the duty of the grower, when making application for compensation, to satisfy the Government that :—

(1) The site of the pit has been properly chosen ;
(2) The potatoes were in sound condition when pitted ; and
(3) Due care was exercised in constructing the pits and in examining the condition of their contents from time to time.

If the Food Controller should decide to take all ware potatoes over a 1⅝ in. riddle in all or any of the areas for which a 1½ in. riddle is specified in the above schedule, the prices for all periods are to be increased by 10*s*. per ton.

[*Retailers' buying price for potatoes delivered to the railway station at which potatoes would be delivered to him in the ordinary course of business.*]

Grade I. .. .. £9 per ton.
Grade II. .. .. £7 " "

UNDERSIZED POTATOES.

Maximum price of all undersized potatoes (other than those sold as and for seed and within the meaning of "seed potatoes" as will be defined by Order of the Food Controller) :—

Per ton, f.o.r. or f.o.b. .. .. .. £3 10*s*.

Note.—The Ministry of Food will purchase the undersized potatoes for which the grower cannot find a market at the rate of £3 per ton riddled free from soil f.o.r. or f.o.b. in all areas and at all periods of the season.

SCHEDULES.*

[*Growers' Prices for sound Ware Potatoes.*]

GRADE I.—KING EDWARD, GOLDEN WONDER, LANGWORTHY, WHAT'S WANTED, AND MAINCROP.

Area.	Average Prices on equal Monthly Deliveries.	For sound ware Potatoes per ton, dressed over riddles specified and delivered f.o.r., or f.o.b., in the periods :—					
		Nov. and Dec.	Jan. and Feb.	Mar.	April.	May and onwards.	Over riddle.
	£ s. d.	£ s.	£ s.	£ s.	£ s.	£ s.	
1. Kent	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
2. *Surrey*	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
2. Sussex	8 18 9	8 0	8 10	9 0	9 10	10 0	1½ in.
3. Wilts, Hants, Berks, Bucks and Oxford	8 8 9	7 10	8 0	8 10	9 0	9 10	1½ in.
4. Essex, Herts, Beds, and Middlesex	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
5. Dorset, Somerset, Glos., Devon and Cornwall ..	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
6. S. Wales and Monmouth ..	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
7. Hereford, Worcester, Warwick, Shropshire and Stafford ..	7 13 9	6 15	7 5	7 15	8 5	8 15	1½ in.
8. Derby, Leicester, Northants, Rutland	7 13 9	6 15	7 5	7 15	8 5	8 15	1½ in.
8*a*. Nottingham ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
8*b*. Soke of Peterboro' :							
From black land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
From other land	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
9. Yorkshire ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
10. Lincolnshire :							
From black land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
From other land	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
11. Norfolk :							
From black land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
From other land	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
11. Suffolk ..	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
12. Cambridge and Hunts :							
From black land	6 13 9	5 15	6 5	6 15	7 5	7 15	1⅝ in.
From other land	7 8 9	6 10	7 0	7 10	8 0	8 10	1⅝ in.
13. N. Wales ..	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
14. Lancashire and Cheshire ..	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
15. Northumberland, Durham, Cumberland and Westmorland ..	7 13 9	6 15	7 5	7 15	8 5		

GRADE II.—ALL VARIETIES OTHER THAN GRADE I.

Area.	Average Prices on equal Monthly Deliveries.	For sound ware Potatoes per ton, dressed over riddles specified and delivered f.o.r., or f.o.b., in the periods :—					
		Nov. and Dec.	Jan. and Feb.	Mar.	April.	May and onwards.	Over riddle.
	£ s. d.	£ s.	£ s.	£ s.	£ s.	£ s.	
1. Kent	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
2. Surrey	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
2. Sussex	8 8 9	7 10	8 0	8 10	9 0	8 10	1½ in.
3. Wilts, Hants, Berks, Bucks and Oxford	7 18 9	7 0	7 10	8 0	8 10	9 0	1½ in.
4. Essex, Herts, Beds, and Middlesex.	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
5. Dorset, Somerset, Glos., Devon and Cornwall ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
6. S. Wales and Monmouth ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
7. Hereford, Worcester, Warwick, Shropshire and Stafford ..	7 3 9	6 5	6 15	7 5	7 15	8 5	1½ in.
8. Derby, Leicester, Northants, Rutland ..	7 3 9	6 5	6 15	7 5	7 15	8 5	1½ in.
8a. Nottingham ..	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
8b. Soke of Peterboro':							
From black land	6 8 9	5 10	6 0	6 10	7 0	7 10	1⅝ in.
From other land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
9. Yorkshire ..	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
10. Lincolnshire:							
From black land	6 8 9	5 10	6 0	6 10	7 0	7 10	1⅝ in.
From other land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
11. Norfolk:							
From black land	6 8 9	5 10	6 0	6 10	7 0	7 10	1⅝ in.
From other land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
11. Suffolk ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
12. Cambridge and Hunts:							
From black land	6 3 9	5 5	5 15	6 5	6 15	7 5	1⅝ in.
From other land	6 18 9	6 0	6 10	7 0	7 10	8 0	1⅝ in.
13. N. Wales ..	7 8 9	6 10	7 0	7 10	8 0	8 19	1½ in.
14. Lancashire and Cheshire ..	7 8 9	6 10	7 0	7 10	8 0	8 10	1½ in.
15. Northumberland, Durham, Cumberland and Westmorland ..	7 3 9	6 5	6 15	7 5	7 15	8 5	1⅝ in.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester, and 1, St. Andrew's Crescent, Cardiff.*

The Land Drainage Act, 1918: Circular Letter.

THE following Circular Letter (No. C. L. 97/C. 1) was addressed to Clerks of County Councils and County Borough Councils in England and Wales by the Food Production Department of the Board on 19th November:—

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to enclose herewith a copy of a leaflet (F.P. No. 56)* summarising briefly the provisions of the Land Drainage Act, 1918.

Owing to a variety of causes, the channels (both natural and artificial) carrying the arterial drainage of agricultural land have in many parts of the country lapsed into such a condition that they are no longer capable of efficiently discharging that function. The experience gained by the Board of Agriculture in the course of carrying out their policy of increased food production, rendered necessary by the pressure of war conditions, has shown that a considerable improvement in arterial drainage is urgently necessary in order that a very large aggregate acreage of potentially good arable and profitable pasture land may not continue to remain derelict or semi-derelict, with a resultant loss of food to the country, and of revenue to the State and to Local Authorities.

The improvements required vary in different districts. Some areas require more or less elaborate schemes involving the expenditure of a considerable amount of money and a large supply of labour, or need the provision of machinery for pumping and other purposes. These cases could not, for obvious reasons, be dealt with during the progress of the War, but in many other instances it was shown that the application of a relatively small amount of labour, rightly directed, would at once set free a considerable acreage for the production of food, and a great deal of good work has been done in this direction by the Agricultural Executive Committees acting on behalf of the Board under the Defence of the Realm Regulations.

Some substantial time may still elapse before schemes can be undertaken which involve the installation of mechanical appliances on an important scale; but there are many, both small and large, which can be carried out by manual labour, so as to effect very substantial improvements. Mr. Prothero is desirous that every effort should be made to maintain the progress that has already been made and to deal with the larger schemes at the earliest opportunity, and for this purpose it is in many cases, where a considerable area is affected and where an efficient authority is not already in existence, a necessary preliminary to any effective action that some authority having complete control of the drainage should be set up for the area.

The Land Drainage Act, 1918, facilitates the establishment of new drainage authorities and the extension of powers of those already

* Printed in this *Journal*, November, 1918, p. 961.

established, and provides in various other ways a ready means of improving arterial drainage. The Act also makes it possible for County and County Borough Councils to assist very largely in the matter. Thus under Section 1 (2) the powers and duties of existing drainage authorities may be transferred to them on their application; under Section 2 (2) a Council may petition the Board for an Order under the Act and thus initiate proceedings for the benefit of drainage; and provision is made in Section 10 for joint action by two or more councils when this is necessary or desirable. Consultation with the County or County Borough Councils concerned is provided for, before the making of any draft order by the Board. Part II. of the Act, which provides a means of enforcing upon drainage authorities and private persons the carrying out of their duties and liabilities in this matter, enables the Board to deal with the drainage of areas too small or otherwise unsuitable for the establishment of drainage authorities. The powers of the Board of Agriculture under this part of the Act may be delegated to a body of persons, the majority of whom shall be members of the County or County Borough Councils in the area concerned.

I am directed to ask you to be so good as to invite the attention of your Council to this important matter, and I am to express the Board's confidence that the Council will be willing to co-operate with them in utilising the provisions of the new Act for the amelioration of drainage conditions in their area either by actually initiating proceedings themselves or by drawing the Board's attention to any case in which it is considered that beneficial action can be undertaken.

I am, etc.,

(Signed) E. M. KONSTAM,

Director of Land Drainage.

Land Reclamation: Schemes for the Demobilisation.

THE War Cabinet have asked the Board of Agriculture to obtain information as to the possibility of carrying out schemes of land reclamation in various parts of the country if supplies of soldier labour should be available for this purpose during the period of demobilisation. The Food Production Department have circularised the Agricultural Committees of the counties on the subject. Of course, the demands of the farmers for labour required on their farms will be fully met before any soldiers are started on reclamation schemes. After the ordinary requirements of the farms have been met it is proposed that any waterlogged areas should first receive attention. Only when both these matters have been dealt with in a satisfactory manner is it intended to take up general reclamation schemes. "It is possible, however," according to the official circular, "that the normal demands of the farms and the treatment of waterlogged areas may not absorb all the labour that will be available, and, if so, it could usefully be employed in reclaiming areas which at present are uncultivated and are producing nothing."

County Committees are asked to furnish at once particulars of any areas exceeding 25 acres at present uncultivated which could be brought into cultivation if labour and funds were available for the purpose. Land which is above 800 feet in altitude should not be included; and any areas which might be reclaimed from the sea should also be reported.

Individuals with knowledge of areas suitable for reclamation may be doing a useful public service by writing to the Food Production

Department, 72, Victoria Street, S.W. 1, giving details. It may be added that during the past two years a considerable number of minor reclamation schemes have been carried out by County Committees or private owners; and that there is no doubt whatever as to the remunerative nature of such enterprises where the area is well chosen and the scheme is intelligently directed and adequately financed. Some fine crops of potatoes grown in England this year were produced by land which as recently as February last was rough heath covered with brushwood.

Acquisition of Land for Ex-Service Men: Repayment of Expenses to County Councils.

THE following is a copy of a letter (No. L. 5150/1918) dated 29th November, 1918, which the Board have addressed to the Essex County Council with regard to repayment of expenses incurred by county councils in relation to the land settlement of ex-Service men:—

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to say that the Board have been informed by Mr. E. O. Fordham, one of their Small Holdings Commissioners, that at a meeting of the Small Holdings and Allotments Committee of the Essex County Council, held on the 5th instant, to consider the Board's Circular Letter of the 16th September last (A. 313/C.)* relative to the land settlement of ex-Service men, the question was raised as to whether the Board were prepared to repay the County Councils' expenses incurred under the Small Holding Colonies (Amendment) Act, 1918.

I am, therefore, to inform you that subject to compliance with their statutory Regulations of 8th September, 1914, made in pursuance of Section 21 of the Small Holdings and Allotments Act, 1908, the Board will be prepared to repay to your Council the whole of the expenses which, in the opinion of the Board, have been necessarily or reasonably incurred by the Council in proceedings in relation to the acquisition by the Council of land for small holdings provided for the settlement of ex-Service men.

I am, at the same time, to say that all the expenses which may be incurred by your Council in making the enquiries referred to in paragraph 8 of the above Circular will also be refunded to them by the Board.

I am, etc.,
(Signed) E. L. MITCHELL,
For Secretary.

Agricultural Labour: *Question in Parliament.*

Mr. George Lambert asked the Under-Secretary of State for War on 19th November if he would state what definite arrangements had been made for releasing agricultural labour from the Army that is urgently needed for the production of next year's crops?

Mr. Macpherson: There are at present over 79,000 men in agricultural companies, and 5,000 ploughmen who are in medical category "A" have just been sent out on two months' furlough. All men at home of any medical category, who are threshers, are now being obtained from the Army. During the harvest 20,000

* Printed in this *Journal*, October, 1918, p. 876.

soldiers were supplied, of whom about 3,000 are still engaged on potato lifting. Any men of low medical category who are experienced farm workers, and are serving at home, are being attached to agricultural companies, and made available for agricultural work.

Mr. Lambert: Assuming there are men of Grade "A" who are really essential for the cultivation of farms, what is the most expeditious method of getting them out of the Army ?

Mr. Macpherson: I am afraid they must come under the demobilisation scheme.

Release of Agricultural Key Men: *Question in Parliament.*

Mr. George Lambert asked on 18th November what arrangements he has made for the release from the Army of the key men for agricultural cultivation and cattle feeding ?

Mr. Prothero: The Board are in consultation with the Ministry of Labour and the War Office on the subject. Though I cannot make any definite statement at the present time, I can assure the right hon. Gentleman that the claims of agriculture will be pressed to the utmost.

Mr. Lambert: Can the right hon. Gentleman say when any of these men will be sent back to their farms ?

Mr. Prothero: I very much hope that some are on their way now

Mr. G. Terrell: Is the right hon. Gentleman pressing the claims of the men who have been recently called up, who are still in this country, and who might be released at once ?

Mr. Prothero: We are getting these men released at once.

Controlled Cereals (Price): *Question in Parliament.*

Mr. G. Lambert (by Private Notice) asked on 19th November if the President of the Board of Agriculture is able yet to say whether the prices paid to farmers for controlled cereals harvested in 1919 will be not less than those now current ?

Mr. Prothero: Yes, Sir; the answer is in the affirmative.

Corn Production (Amendment) Act (Claims): *Question in Parliament.*

Mr. Duncan Millar asked tbe President of the Board of Agriculture on 18th November the number of claims which have been referred to arbitration under the provisions of the Corn Prodnction (Amendment) Act, 1918, the number of claims which have been settled without being referred to arbitration under the Act, and the total sum paid in settlement of such claims ?

Mr. Prothero: Up to the present no claims for compensation have been referred to arbitration under the Corn Production (Amendment) Act. 158 claims have been settled without reference to arbitration, and lump sum payments amounting to £12,952 5*s.* 3*d.* have been made, as well as annual payments in lieu of rent amounting to £2,570 11*s.* 11*d.* per annum.

International Trusts: *Question in Parliament.*

Mr. Tillett asked the Prime Minister on 19th November whether he is aware of the existence of international trusts which operate the world's and home markets in meat, milk, wheat, and other essential foodstuffs with the result of the keeping up of prices to the hurt of the poor; and whether he proposes to introduce legislation for the purpose of making such trusts illegal?

Major Astor: I have been asked to reply. The Food Controller is aware that there are certain international combinations operating in foodstuffs as well as other commodities. The Inter-Allied Food Council may be trusted to combat the dangers arising from food combinations abroad, and the hon. Member may rest assured that effective measures will be taken to prevent any rigging of the markets by trade combinations at home.

THE following Notice was issued by the Food Production Department of the Board on 29th November:—

Tenure of Allotments.

It is found that many holders of allotments under the Cultivation of Lands Orders are still in doubt as to the period for which they hold their plots. In order to make the position clear the Food Production Department issue the following statement on the subject:—

As the result of recent legislation—The Corn Production (Amendment) Act, 1918 (Section 1) and the Defence of the Realm (Acquisition of Land) Act, 1916 (Section 1)—allotment holders under the Cultivation of Lands Orders are now secure in the occupation of their plots until the expiration of two years from the "termination of the present war" (which term has to be defined by Parliament) except in those cases where it is shown to the satisfaction of the Board that the land is required earlier for building or other special purposes, or where the compensation payable if the land is retained would be in excess of the value to the nation of the food produced. If, owing to the land being required for one or other of the above-mentioned purposes, any such allottee has to surrender his plot before 1st January, 1920, he will be compensated by the Board of Agriculture for the growing crops, etc.

Powers conferred by the Small Holdings and Allotments Act, 1908, however, provide the means of securing longer periods of possession for those allotment holders under the Cultivation of Lands Order whose land is not required for the purposes already specified. These powers enable Local Allotment Authorities in agreement with owners to take allotment land for long leases.

The Board of Agriculture have asked Local Authorities to take every opportunity of leasing such land; and in certain districts action in this direction has already been taken.

THE following Notice was issued by the Food Production Department of the Board on 22nd November:—

Allotment Produce: Official Reassurance.

A rumour appears to be current in various parts of the country to the effect that allotment holders are prohibited from selling the surplus produce of their land unless they have obtained a retailer's licence. The Food Production Department have issued an assurance that this rumour is entirely without foundation. No Order compelling allotment holders to obtain a retailer's licence has

been made by the Ministry of Food; nor does that body propose make any such Order. Allotment holders are perfectly at liberty dispose of their produce in any way that they deem advisable.

Vegetable Marrow Growing.

ACCORDING to a Notice issued by the Food Production Departme towards the end of November, a grower in Berkshire who had si acres of land on which he could have plante nothing else this year, responded to the invit tion of the authorities to grow vegetab marrows by sowing this area with marro seed. It produced 24 tons 3 cwt., and he sold the crop through th Berkshire Fruit and Vegetable Society, which works under the Foo Production Department Scheme for marketing surplus produce, for £14 In reporting the matter to the county society the grower says tha had it not been for that body, which provided an easy means throug which to dispose of the marrows, he would not have bothered to gro them at all. A good deal of similar testimony as to the stimulatin effect on food production of the county marketing schemes has bee received during the past season.

The Apples (Prices) Order, 1918.

OWING to the removal of restrictions on the importation of apple the Food Controller has issued an Order which came into force on th 16th December, 1918, revoking as from th date the Apples and Perry Pears (Sale Order, 1918. The new Order controls the pri of all apples, whether home-grown or importe

The maximum retail price is 9*d*. per lb., and retailers are require to exhibit notices stating this maximum price. In the case of hom grown apples, the maximum price on a sale by the first owner, *i.e* the grower, is 58*s* 4*d*. per cwt. (packages may be charged for as provide by the Order).*

NOTE.—On a wholesale sale of any apples by a person other than the fir owner, the maximum price is the first owner's price, together with the add tion of 6*s*. per scheduled barrel or 2*s*. per scheduled case, or 10 per cent. o the first owner's price in any other case. Transport charges and market tol may be added, and, in the case of home-grown apples, certain charges set ou in the Order for the use of packages, may also be made.

Sale of Agricultural Horses: Withdrawal of Prohibition.

THE Food Production Department of the Board announce tha the Defeuce of the Realm Regulation under which the sale of horse owned by occupiers of agricultural holding was prohibited except uuder licence wa withdrawn on the 23rd November.

Live Stock (Restriction on Shipment to Channel Islands) Order, 1918.

AN Order (No. 1495), dated 19th November, 1918, has been mac by the Food Controller to the effect that:—

1. A person shall not, after the 1st Decem ber, 1918, send, take, consign or ship an cattle from Great Britain to any part of th Channel Islands, except under and in accord ance with the terms of a permit granted by o under the authority of the Food Controlle

2. Every application for a permit under this Order shall be made t the Live Stock Commissioner having jurisdiction in the area from whic it is proposed to send or take such cattle.

3. Permits issued under this Order may be made subject to such conditions as may be inscribed thereon or as may otherwise be prescribed by the Food Controller. The holder of any permit shall duly observe the conditions thereof and shall produce such permit upon the demand of any person duly authorised in that behalf by the Food Controller.

4. Permits issued under this Order shall not authorise or be deemed to authorise any movement of cattle in contravention of any Order of the Board of Agriculture and Fisheries made under the Diseases of Animals Acts, 1894 to 1914, or any regulation made thereunder.

The Cattle Feeding Stuffs (Distribution) Order, 1918: Notice and General Licence.

THE Food Controller has issued a Notice (Order No. 1502, dated 20th November, 1918), under the Cattle Feeding Stuffs (Distribution) Order, 1918*, stating that a person named as a supplier in any certificate granted under the above named Order in respect of an application made on the prescribed forms L.F.S. 3 (Pig Clubs) and L.F.S. 4 (Small Owners of Pigs) may supply to the person named or referred to as a buyer in such certificate, and a person named or referred to as a buyer in such certificate may obtain from the person named therein as a supplier, millers' offals to an amount exceeding by 50 per cent. the amount stated in such certificate.

The Food Controller has also issued a General Licence under this Order dated 20th November, allowing producers of cattle feeding stuffs to use, for the purpose of feeding horses employed by them solely for their trade or business, supplies of the particular cattle feeding stuffs produced by them. This permission does not exempt such persons from complying with the provisions of the Horses' Rationing (No. 2) Order, 1918.†

Sale of Straw for Thatching in Great Britain.

THE Army Council have made an Order, dated 13th November, 1918, prescribing that where a farmer is desirous of purchasing straw (other than oat straw) from a producer for the purpose of thatching ricks of corn or hay, he may do so, subject to the following conditions:—

1. The purchaser must deliver to the seller a certificate stating—
   (*a*) The quantity of straw required, which must not exceed 3 tons in any one instance.
   (*b*) That the straw is required for thatching ricks of hay or corn and for no other purpose.

2. The certificate must be signed by the purchaser and must give his address together with the name and address of the seller.

3. When the whole of the straw for which the certificate is given has been removed, the seller must forward the certificate to the District Purchasing Officer for Supplies of the county concerned.‡

4. The price paid for such straw shall not exceed the maximum stack price laid down by any Army Council Order that may for the time being be in force, together with any actual cost incurred for tying, or carting a distance further than the nearest railway station.

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* Printed in this *Journal*, November, 1918, 1008.

† Printed in this *Journal*, November, 1918, p. 1005.

‡ A list of the names and addresses of these officers was printed in this

The Grain (Prices) Amendment Order, 1918.

AN Order (No. 1484), dated 14th November, 1918, has been made by the Food Controller amending the Grain (Prices) Order, 1918,* as follows :—

1. Where barley is bought by a person requiring and holding a licence granted by or under the authority of the Food Controller to purchase barley for a manufacturing business carried on by him, or by a recognised dealer buying for the purpose of filling a specific order given in writing by such a manufacturer, the maximum price shall be ascertained by adding 3s. per quarter to the standard rate.

2. Notwithstanding the provisions of Clause 9 of the Principal Order a person shall not until the 1st January, 1919, buy or sell or offer to buy or sell any barley for the purpose of seed at a price exceeding the maximum price for barley applicable under the Principal Order.

NOTE.—This Order came into force on the 14th November, 1918.

The Eggs (Prices) Order, 1918.

THE Food Controller has, by an Order (No. 1429), dated 7th November, 1918, fixed the following maximum prices for the sale of eggs. The Order came into force on 2nd December, 1918.

Description of Eggs.	For a Sale other than by Retail. At a rate of per doz.	For a Sale by Retail. At a rate of per doz.
	s. d.	s. d.
Fresh eggs	5 0	5 6
Imported fresh eggs	5 0	5 6
Preserved eggs	4 0	4 6
Small eggs	2 8	3 0

The expression "eggs" shall include the eggs of any bird, except plovers' eggs and gulls' eggs.

The expression "fresh eggs" shall mean eggs produced in the United Kingdom, each weighing 1½ oz. or more, and not having been preserved either by pickling or by being held in cold store, or otherwise.

The expression "imported fresh eggs" shall mean eggs imported into the United Kingdom each weighing 1½ oz. or more and not having been preserved either by pickling or being held in cold store or otherwise.

The expression "preserved eggs" shall mean eggs each weighing 1½ oz. or more, which have been preserved either by pickling or by being held in cold store or otherwise.

The expression "small eggs" shall mean all eggs weighing less than 1½ oz.

THE following Notice was issued by the Food Production Department of the Board on 1st December :—

Importance of Winter Spraying.

Fruit growers are reminded that from now until the buds begin to break in February or March, is the time to clean trees covered with moss or lichen.

The fruit plantation or orchard must be kept in a thoroughly sanitary condition if insect and fungus pests are to be controlled; firstly, because the growth of moss and lichen has a stunting effect on the trees and makes them less resistant to disease, and, secondly, because the number of insects which can hibernate actually on the trees is greatly reduced. A thorough drenching with a caustic soda solution (1 lb. of caustic soda to 5 gal. of water) is the most satisfactory way of ridding the trees of moss and lichen.

On trees which are not very foul but which still require cleaning, lime wash or lime-sulphur solution (winter strength) may be substituted. Lime washing should be deferred until as near the end of the dormant season as possible; the attacks of aphis and apple sucker are thereby controlled by the coating of lime preventing large numbers of eggs from hatching. In fact, the most effective applications are made when the buds are just breaking and showing green. Lime-sulphur (winter strength) can be used for cleansing the trees whilst they are quite dormant and for this purpose 3 qt. of concentrated lime-sulphur solution (1·3 sp. gr.) should be diluted with 10 gal. of water, or as the buds are just breaking, when the strength should be 3 pt. of concentrated lime-sulphur to the same quantity of water. Before the application of any of these washes all dead branches and diseased wood should be removed from the trees and burnt.

After using a lime or lime-sulphur wash, care must be taken to clean thoroughly all valves and internal parts of the spraying machines before putting them away. If a lime-sulphur wash is used, care must be taken not to use a machine with a copper container, as the copper and sulphur will react and render the machine useless for further work.

For full particulars as to the making of the various washes, readers are referred to *Food Production Leaflet No.* 39, "The Control of Pests of Fruit Trees in Gardens and Small Holdings," obtainable from the Secretary, Board of Agricnlture, 3, St. James's Square, London, S.W. 1, on receipt of an unstamped post-card.

THE following Notice was issued by the Board on 13th November :—

From time to time the attention of the Board is directed to cases of illness, or even death, of calves resulting from the use of linseed or linseed cake. In view of the widespread popularity of these foods for calf-rearing it is obvious that such cases of trouble must be comparatively rare, but they serve to direct attention to the fact that a certain amount of care is necessary in the feeding of linseed or linseed cake to young stock. The risk is negligible with adult animals, and in the case of young animals only arises when the linseed meal or linseed cake has been treated with water some little time before feeding. It is due to the fact that linseed contains two substances which in presence of water tend to interact and produce small quantities of the deadly poison, prussic acid. This does uot prevent linseed and linseed cake

Linseed Poisoning.

being very good and very safe foods *when properly used*. All that is necessary is that if the linseed is treated with water at all it must be kept for a little time at practically boiling temperature. The safest plan is actually to *boil the linseed with the water*; if this cannot be done conveniently and "scalding" is resorted to, it is necessary that the water should be absolutely boiling as it is poured on the meal, using at least ten times as much water as meal (1 gal. water to 1 lb. meal) and stirring carefully until quite free from lumps. If this procedure is followed closely the mixture should be quite safe to feed, especially if prepared not long before feeding time.

As a rule home-grown linseed offers less risk of poisoning than linseed imported from hotter climates, but there is no linseed meal (or cake) which can not be rendered quite harmless if properly prepared for feeding in the manner indicated.

Beekeeping.

IN a Circular Letter (No. C.L. 58/H.), dated 22nd November, 1918, addressed to Horticultural Sub-Committees, the Food Production Department state that, in order to secure the adequate distribution of the limited supplies available, and to make sure that these supplies are used solely for bee food, the Royal Commission on Sugar Supply has notified the Department of its decision to ration the candy or bee food to beekeepers.

The Royal Commission is prepared to recognise the County Horticultural Sub-Committees as the agents for carrying out the rationing scheme, and Horticultural Sub-Committees are asked to form forthwith a Bee Committee for the purpose of assisting the Department in carrying out the rationing scheme. The Department suggest that the Bee Committee should be composed of members of the Horticultural Sub-Committee, say the Chairman and not less than three other members, together with three co-opted members, representative of the bee-keeping interests in the county. In the event of there being a salaried beekeeper in the county, it is suggested that the committee should take steps to secure his services on the committee.

In order to carry these suggestions into effect, it is desirable that committees should immediately approach the Beekeepers' Association in the county with the view of obtaining their co-operation in the nomination of suitable representatives.

The procedure with respect to the rationing scheme will be as follows:

The Bee Committee will compile a register of the beekeepers, and of the stocks of bees in the county. Each beekeeper will be required to register prior to 31st December, 1918, on a special form supplied by the Department. The forms are in the course of preparation, and as soon as they are available the Bee Committee will take all the necessary steps to inform beekeepers that if they are to receive their due ration of bee food for Spring feeding, they must register with the Horticultural Sub-Committee before the above date.

The returns thus obtained will provide a complete survey of the state of beekeeping in the county, and will indicate the number of beekeepers and the number of live stocks, (*a*) in movable hives, (*b*) skeps, boxes or other make-shift hives. The committee will supply the Horticultural Division with the returns thus obtained, and the returns will serve as a basis for the allocation of bee food to the beekeepers in the county.

The Bee Committee will arrange with local retailers for the distribution of the candy ration of bee food, and it will be necessary to make known throughout the county the names of distributors, so that bee-keepers may be able to secure their ration by presenting a signed duplicate of their registered form.

The Horticultural Sub-Committee should notify the Department as soon as the Bee Committee is constituted, in order that they may be informed of the Department's proposals with respect to the County Bee-Restocking Schemes, and the provision for technical advice and instruction.

THE following Notice was issued by the Food Production Department of the Board towards the end of November :—

Organised Horticulture.

The Food Production Department have appointed nine Divisional Technical Inspectors (three for fruit and six for vegetables and general cultivation), who have been instructed to get into touch with Horticultural Sub-Committees with the idea of arriving at a common plan of action for securing that instruction and advice on technical matters relating to horticulture may be given on definite lines throughout the counties. The Department wishes arrangements to be come to with the Royal Horticultural Society and other bodies so that the whole country may be covered during the autumn and winter by lectures given on up-to-date methods.

All applications for lectures to allotment associations, etc., must be made direct from the Secretary to the Horticultural Sub-Committee of the county.

THE following Press Notice was issued by the Food Production Department of the Board on 18th November :—

Waste Lime from Acetylene Manufacture.

Owing to the continued action of acid fumes from manufacturing processes and possibly to a natural deficiency of lime, the soils in the vicinity of large towns frequently become acid and their crop-producing power suffers accordingly. The attention of allotment holders in these districts is, therefore, drawn to the value, for soil treatment, of the waste lime that is often produced locally in the manufacture of acetylene gas. Recent investigation by the Food Production Department has shown that, when in a well-drained condition, such waste lime possesses a value approaching that of carbonate of lime as an improver of soil conditions. When in the fresh state the lime is distinctly wet, but the excess liquor rapidly drains away and the lime becomes more or less friable. It is recommended, however, that it should be applied to the land at the rate of about ½ cwt. per rod in autumn or early winter and exposed to the action of rain and frost. It may then be raked or dug into the soil during the spring.

WITH reference to the Notice on the outbreak of Rabies in Devon and Cornwall, which was published on page 1023 of the issue of this *Journal* for last month, 90 outbreaks of this disease have now been confirmed, and there are 45 cases at present under investigation.

Rabies.

THE following Notice was issued by the Board on 27th November:—

Sale of Glebe Land.

The President of the Board of Agriculture and Fisheries desires to inform Incumbents who propose to dispose of their land under the Glebe Lands Act, 1888, that it is unnecessary for them to incur any initial expenses in having the land valued. It is the Board's practice, in dealing with applications for their approval to sell under the Glebe Lands Act, themselves to select and instruct the valuer.

Memoir on the Water Supply of Essex from Underground Sources.

THE Board of Agriculture and Fisheries desire to give notice of the publication by H.M. Geological Survey of Great Britain of a Memoir on the Water Supply of Essex from underground sources, price 15*s*.

The Memoir contains, in addition to well-records, chapters dealing with the water-bearing beds, rainfall, chemistry of Essex waters with analyses, contamination and risk thereof, supplies from springs, wells and borings. It is accompanied by an extensive bibliography and by maps showing (1) the underground water-level in the chalk around the head-waters of the Stort and Cam, (2) the amount of chlorine in deep-well waters, (3) wells giving alkaline waters, (4) the rainfall.

Copies may be obtained through any bookseller from Messrs. T. Fisher Unwin, Ltd., 1, Adelphi Terrace, London, W.C., who are the sole wholesale agents to the Trade outside the county of London; or from the Director-General, Ordnance Survey Office, Southampton.

Advances of Seed Grain in Alberta.

Two Acts of direct agricultural interest were adopted at the recent session of the Alberta Legislature:—

Municipal Districts Seed Grain Act.—The Municipal Districts Seed Grain Act gives municipalities power to borrow money on the guarantee of the province for the purchase of seed grain to be supplied to resident owners and tenants on patented lands, the loan to the latter not to exceed $300 (£60) in value for each quarter section. The interest charged is not to exceed that paid by the municipal district, and the debt is to be secured by a lien on the crop and on the land. If the declaration note is not paid by the 31st December, it rests with the secretary of the municipality to enforce the lien by distress or suit.

The Seed Grain Act, 1918.—The Seed Grain Act, 1918, is almost identical with the Seed Grain Act of 1917, and provides that the Provincial Treasurer, or the Minister of Agriculture, can authorise any person to advance seed grain, or any chartered bank to advance money for the purchase of seed grain, to owners or occupiers of patented lands, other than in municipal districts, or to the wives or other representatives of owners who are on active military or naval service, and the Provincial Treasurer or any chartered bank, or individual, advancing seed grain, or money for the purchase of the same, is entitled to take security by promissory note, real estate mortgage, or chattel mortgage. Penalties are provided for persons making use of seed grain, or the money advances

Leaflets Issued by the Board of Agriculture. SINCE the date of the List given on p. 246 of the *Journal* for May, 1918, the following Leaflets have been issued in the *Permanent Series* :—

No. 301.—*Insect and Fungus Pests of Basket Willows.*
,, 322.—*Winter Pruning Bush and Half Standard Apple Trees.*
,, 324.—*Buttermilk Cheese.*
,, 325.—*The Manufacture of Small Cheese with Improvised Apparatus.*

The following *Food Production Leaflets* have been issued :—

F. P. No. 14.—*The Rearing of Calves in the Summer and Autumn of* 1918.
,, ,, 30.—*Preparing Rabbits for the Table and Market.*
,, ,, 45.—*Skim Milk Cheese.*
,, ,, 46.—*The Feeding of Concentrated Food to Dairy Cows on Pasture.*
,, ,, 47.—*The Testing of Seeds Order, 1918.* (This replaces Food Production Leaflet No. 18.)
,, ,, 48.—*How to Increase Stocks of Bees.*
,, ,, 49.—*The Need for Caution in the Feeding of Live Stock under Present Conditions.*
,, ,, 50.—*The Harvesting of Corn Crops.*
,, ,, 53.—*Storage of Sulphate of Ammonia on Farms.*
,, ,, 54.—*The Cropping of Grass Land Broken up for 1918 Harvest.*
,, ,, 55.—*Methods of obtaining Strong Stocks of Bees for Overwintering.*
,, ,, 56.—*Floods and Waterlogged Land : The Land Drainage Act of 1918.*
,, ,, 58.—*Silver Leaf Disease in Fruit Trees.*
,, ,, 59.—*Economy in the Use of Hay.*

In addition, the information in the following *Permanent Leaflets* has been revised and brought up to date :—

No. 4.—*Winter Moths.*
,, 9.—*Ensilage.*
,, 10.—*Wireworms.*
,, 11.—*The Daddy Longlegs, or Crane Flies.*
,, 12.—*The Gooseberry Sawfly.*
,, 15.—*The Apple Blossom Weevil.*
,, 16.—*The Apple Sucker.*
,, 18.—*The Fertilisers and Feeding Stuffs (General) Regulations, 1906.*
,, 25.—*Chafer Beetles, or White Grubs.*
,, 26.—*Tenant Farmers, Income Tax and Accounts.*
,, 33.—*Surface Caterpillars or Cutworms.*
,, 35.—*The Celery Fly.*
,, 38.—*The Carrot Fly.*
,, 63.—*Destruction of Charlock.*
,, 70.—*The Treatment of Neglected Orchards.*
,, 77.—*Finger-and-Toe in Turnips.*
,, 86.—*Brown Rot of Fruit.*
,, 105.—*Wart Disease (Black Scab) of Potatoes.*
,, 114.—*The Feeding of Poultry.*
,, 122.—*The Cabbage Root Fly.*
,, 164.—*Potato Leaf Curl.*

No. 175.—*The Use of Waste Organic Substances as Manures.*
,, 188.—*Fumigation with Hydrocyanic Acid Gas.*
,, 202.—*The Frit Fly.*
,, 204.—*Apple Tree Mildew.*
,, 221.—*Mutual Insurance of Live Stock.*
,, 222.—*Meadow Saffron.*
,, 223.—*The Brown Scale.*
,, 235.—*Organisation of the Milk Supply.*
,, 244.—*The Destruction of Rats.*
,, 249.—*" Couch " or " Twitch."*
,, 252.—*Pruning Fruit Trees.*
,, 262.—*Tomato-Leaf Rust.*
,, 265.—*Rabbit Keeping.*
,, 279.—*Technical Advice fo[r] Farmers.*
,, 283.—*Picking and Storing [o]f Apples and Pears grow[n] by Small Cultivators.*
,, 306.—*The Goat as a Source [o]f Milk.*
,, 308.—*Plum Aphides.*
,, 310.—*Poultry on Allotments a[nd] Garden Plots.*
,, 317.—*Rearing of Chickens.*
,, 322.—*Winter Pruning Bush a[nd] Half Standard Ap[ple] Trees.*

The following Leaflets, formerly issued in the series of Special Leaflets, have been added to the *Permanent Series* :—

No. 321.—*Notes on Essential Points in Poultry Feeding.* (Formerly Special Leaflet No. 12.)
,, 323.—*The Profitable Utilisation of Surplus Milk.* (Formerly Special Leaflet No. 78.)

The following *Food Production Leaflets* have been revised and brought up to date :—

F.P. No. 4.—*Jam Making in War Time.*
,, 12.—*Grease Banding of Fruit Trees.*
,, 15.—*The Use of Sulphate of Ammonia as Manure.*
,, 17.—*Economy in the Feeding of Horses.*
,, 25.—*Economy in the Feeding of Dairy Cows.*
,, 27.—*Potash Supplies during the War.*
,, 28.—*Leaflet on Potato Wart Disease specially prepared for Children who cultivate Small Gardens, and for Amateurs in Gardening.*

The following Leaflets, formerly in the series of Special Leaflets, have been transferred to the *Food Production Series* :—

F.P. No. 20.—*The Use of Straw for Fodder.* (Formerly Special Leaflet No. 47.)
,, 38.—*Wheat Growing.* (This Leaflet supersedes Special Leaflets Nos. 7 and 22.)
,, 44.—*Co-operation and the Supply of Farm Implements.* (Formerly Special Leaflet No. 62.)
,, 51.—*Suggestions for the Cultivation of Catch Crops and Home-Grown Feeding Stuffs.* (Formerly Special Leaflet No. 28.)
,, 52.—*Distribution of Fruit and Vegetables through the London and Provincial Markets.* (This replaces Special Leaflet No. 63 on *The Carriage of Fruit and Empties.*)

The following Leaflets, which had been withdrawn from circulation, have been re-written and re-issued in the *Permanent Series* :—

No. 92.—*Bunt and Smut.*
,, 131.—*Apple and Pear Scab.*
,, 198.—*Rearing and Marketing of Geese.*

The following Leaflets have been withdrawn from circulation :—

No. 7.—*Autumn Catch Crops and Fodder Supply.*
,, 17.—*Preservation of Commons.*
,, 36.—*Cultivation of Osiers.*
,, 37.—*Rabies.*
,, 123.—*The Shoot and Fruit Moth of Red and Black Currants.*
,, 196.—*Fertilisers and Feeding Stuffs Act,* 1906.
,, 203.—*The Utilisation of Peat Lands.*
,, 206.—*Grain Weevils.*
,, 301.—*Rabbit Breeding for Small Holders—Housing and General Management.*

The following Special Leaflets have been withdrawn from circulation :—

No. 4.—*Poultry as Farm Stock.*
,, 12.—*Notes on the Purchase and Preparation of Food for Poultry in Gardens and Allotments.*
,, 14.—*Poultry Colonies as Farms.*
,, 33.—*Suggestions for Increasing the Egg Supply.*
,, 37.—*Economy in Food: Appeal to Country People.*
,, 55.—*How to Increase the Production of Food during the War.*
,, 69.—*The Culture of Early Potatoes under Glass.*

A List of the Board's Leaflets may be obtained post free on application to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1. Letters of application so addressed need not

THE following Notice was issued by the Board on 10th December :—

Reconstruction of the Commercial side of Agriculture: Official Appointment.

In order to deal with some of the urgent commercial problems in connection with agriculture which will arise during the period of demobilisation and reconstruction, the President of the Board of Agriculture and Fisheries has appointed Mr. Lawrence Weaver, C.B.E., formerly Controller of Supplies in the Food Production Department, to act as (temporary) Commercial Secretary of the Board

A temporary establishment will be formed by the amalgamation of various branches within the Board, and will be charged with all reconstruction measures for the better organisation of the commercial side of agriculture, with farmers' supplies (hitherto dealt with by the Supplies Division of the Food Production Department), rural transport, and cognate matters. Mr. Weaver will also supervise the provision of cottages and other buildings on small holdings and farm colonies required for the re-settlement of service men on the land.

THE following Press Notice was issued by the Ministry of Food on 6th December :—

Additional Supplies of Chicken Food.

With a view to providing additional supplies of chicken food at reasonable prices, the Ministry of Food is arranging to render available limited quantities of the materials necessary for the manufacture of such food for chicks up to six weeks old. Firms desiring to receive allocations should apply to the Director of Feeding Stuffs Supplies, New County Hall, London, S.E. 1, for a copy of Form Ch.R. 1.

Allocations will only be made to Firms who made these mixtures in 1916, and will be made in proportion to the quantities dealt with during that year. Makers will be required to comply with the directions issued by the Ministry of Food as to the distribution of the manufactured foods and as to the prices to be charged.

Applications for very small quantities cannot be entertained, but small firms who are able to group their demands together for delivery to one railway station may make joint application.

Retailers who wish to receive supplies for sale of the foods made under the above arrangements, should apply to their usual suppliers of chicken foods. In any case of difficulty in obtaining supplies, application should be made to the above address.

The Dredge Corn Order, 1917: General Licence.*

NOTWITHSTANDING the provisions of the Dredge Corn Order, 1917,† the Food Controller has authorised as from the 1st December, 1918, until further notice, every producer of such dredge corn as consists of a mixture of cereals grown together containing more than one cereal as a main constituent, to use such dredge corn for the purpose of feeding his live stock.

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* Order No. 1602, dated 24th November, 1918.

this

The Cattle Feeding Stuffs (Maximum Prices) Order, 1918.*

THE Food Controller, by an Order (No. 1578), dated 30th November, 1918, has prescribed that as from the 3rd December, 1918, until further notice, the maximum price on a sale of flour millers' offals of all kinds shall be £14 10s. per ton in place of £13.

Revocation of the Potatoes (1918 Crop) (Restriction) Order, 1918.

THE Food Controller has issued an Order (No. 1590), dated 31st October, 1918, which provides that the Potatoes (1918 Crop) (Restriction) Order, 1918,† shall be revoked without prejudice to any proceedings in respect of any contravention thereof.

The Potatoes (Consolidation) Order, 1918: General Licence.‡

THE Food Controller has issued a General Licence under the Potatoes (Consolidation) Order, 1918,§ providing that notwithstanding the restrictions imposed by Clause 2 (*a*) of this Order, potatoes may until further notice be moved and consigned from the Zonal area P.C.7, comprising Herts, Essex (outside London Postal Area), Middlesex (outside Londou Postal Area), and Bedford, to the Zonal area P.C.6, comprising London (Postal Area), and purchases may be made and delivery taken of potatoes accordingly.

Agricultural Returns of England and Wales, 1918. Produce of Crops.¶

PRELIMINARY statement (dated 4th December, 1918), showing the estimated total produce and yield per acre of the potato and root crops in England and Wales in the year 1918, with comparisons for 1917, and the average yield per acre of the ten years 1908-1917.

—	Crops.	Estimated Total Produce.		Acreage.		Average Estimated Yield per acre.		Average of the Ten Years 1908-1917.
		1918.	1917.	1918.	1917.	1918.	1917.	
		Tons.	Tons.	Acres.	Acres.	Tons.	Tons.	Tons.
ENGLAND AND WALES.	Potatoes ..	**4,209,000**	3,341,000	**633,832**	507,987	**6·6**	6·6	6·3
	Turnips and Swedes ..	**12,018,000**	12,164,000	**909,285**	969,131	**13·2**	12·6	13·1
	Mangold ..	**8,231,000**	8,482,000	**399,727**	387,453	**20·6**	21·9	19·5
ENGLAND	Potatoes ..	**3,987,000**	3,143,000	**596,607**	473,342	**6·7**	6·6	6·3
	Turnips and Swedes ..	**11,233,000**	11,414,000	**856,983**	918,313	**13·1**	12·4	12·9
	Mangold ..	**7,988,000**	8,263,000	**386,512**	375,525	**20·7**	21·0	19·5
WALES	Potatoes ..	**222,000**	198,000	**37,225**	34,645	**6·0**	5·7	5·5
	Turnips and Swedes ..	**785,000**	750,000	**52,302**	50,818	**15·0**	14·8	15·4
	Mangold ..	**243,000**	219,000	**13,215**	11,928	**18·4**	18·4	18·1

* Printed in this *Journal*, March, 1918, p. 1474.
† Printed in this *Journal*, September, 1918, p. 740.
‡ Order No. 1499, dated 20th November, 1918.
§ Order No. 1428, dated 5th November, 1918. See Note on p. 1114, and following pages.
¶ See also Note on Agricultural Conditions in England and Wales on 1st December, on p. 1139.

Prosecutions of Farmers, etc., under Statutory Rules and Orders.

CHARLES FORSYTH, Saplinbrae, Tyrebagger, Aberdeenshire, was charged at Aberdeen with having used 900 2-lb. loaves for feeding pigs and poultry. For 15 years accused had obtained rejected loaves from an Aberdeen firm of bakers for this purpose. In some of the loaves the dough had not risen, several were burnt, and some were too old for human food. They were consigned in boxes for 1*s.* per box. The magistrates said the action of the firm who sold the bread must be very carefully investigated. Defendant had made a substantial profit, as he could get big prices for poultry and pigs. A fine of £10 was imposed.

William Collins, treasurer of a poultry association, was charged with having obtained barley for the feeding of poultry. It was stated that he had approached a farmer who had some barley but questioned his right to sell it for the purpose. Defendant expressed the opinion that such a sale was in order, and the farmer, after taking advice, agreed. The barley was delivered at the Association's Headquarters. The Authorities demanded a return of all corn purchased by this body, and Collins, though submitting that the barley was not fit for human use, was fined. (*National Food Journal*, 9th October, 1918.)

At Ross a fine of £70, with £5 special costs, was imposed on Arthur Thomas Webb, Hill of Eaton, Foy Ross, farmer, for selling the carcass of a beast to a butcher without being registered as a wholesale dealer in meat. Defendant slaughtered a casualty beast privately and sold it to a local butcher. On hearing that the Divisional Inspector was in the district he arranged to fetch the carcass away again. In the meantime, however, the local butcher had sold over 30 lb. of meat from it.

Harry Parry, the butcher, was fined £5 for aiding and abetting. (*National Food Journal*, 23rd October, 1918.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for November, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Spain, Great Britain, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 250,300,000 qr. in 1918, against 211,994,000 qr. in 1917, or an increase of 18·1 per cent. *Rye.*—The estimated production in Spain, Ireland, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, and United States is placed at 18,726,000 qr. this year, or an increase of 31·5 per cent. compared with last year, when it amounted to 14,245,000 qr. *Barley.*—The production in Spain, United Kingdom, Italy, Luxemburg, Switzerland, Canada, United States, Japan, Egypt, and Tunis is

estimated to amount to 71,165,000 qr. in 1918, against 64,976,000 qr. in 1917, or an increase of 9·5 per cent. *Oats.*—It is estimated that the total yield in Spain, United, Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, and Tunis will amount to 254,044,000 qr. in 1918, against 249,596,000 qr. in 1917, or an increase of 1·8 per cent. *Maize.*—The production in Spain, Switzerland, Canada, and United States is estimated at 324,596,000 qr. this year, against 372,861,000 qr. last year, or a decrease of 12·9 per cent.

Canada.—According to the official report issued by the Dominion Bureau of Statistics on 18th September, the preliminary estimates of the average yield per acre of the principal grain crops are as follows, the figures for last year, and the average for the last ten years, being given in brackets :—Spring wheat, 12½ (15½ and 19) bush. ; autumn wheat, 16½ (21½ and 23) bush. ; barley, 25½ (23 and 27) bush. ; oats, 33 (30¼ and 35¼) bush. ; rye, 14½ (16¼ and 18¼) bush. ; linseed, 8 (6½ and 10½) bush. The condition of other field crops on 31st August, measured against 100 as representing the average decennial yield, is as follows :—Mixed grains, 100 ; peas and beans, 106 ; buckwheat, 91 ; potatoes, turnips, mangolds, etc., 96 ; maize for fodder, 96 ; pastures, 87. The stocks in Canada on 31st August were about 4,000,000 bush. of wheat, 1,453,500 bush. of barley and about 15,000,000 bush. of oats, the quantities in farmers' hands being about 400,000 bush. of wheat, 354,000 bush. of barley, and 8,500,000 bush. of oats.—(*The London Grain, Seed and Oil Reporter*, 3rd December, 1918.)

United States.—According to a Government Report the maize crop is estimated at 2,749,000,000 bush., as against 3,159,000,000 last year. This is 31,000,000 bush. above the October estimate. The quality of the crop is excellent. Farm reserves are 118,400,000 bush. against 34,400,000 bush. last year, and the supply is 12,000,000 bush. above the average for the last five years.—(*The London Grain, Seed and Oil Reporter*, 28th November, 1918.)

New Zealand.—According to the official interim report of the Department of Agriculture on the crop returns for the season 1917–18, the yields of crops, according to threshing returns, were as follows, last season's figures being given in brackets :—Wheat, 6,761,249 (5,251,227) bush. : barley, 572,061 (738,050) bush. ; oats, 4,785,391 (5,371,436) bush. ; maize, 363,689 (274,283) bush. ; potatoes, 97,944 (133,642) bush.—(*Broomhall's Corn Trade News*, 21st November, 1918.)

Live Stock in Canada.—The numbers of live stock in Canada in 1918 are as follows (the corresponding figures in 1917 being shown in brackets): Horses 3,608,315 (3,412,749) ; milch cows, 3,542,429 (3,202,283) ; other cattle, 6,507,267 (4,718,657) ; sheep, 3,037,480 (2,369,358) ; pigs, 4,289,682 (3,619,382). (*International Crop Report and Agricultural Statistics*, November, 1918.)

Live Stock in New Zealand.—The numbers of live stock in New Zealand on the 31st January, 1918, are as follows (the numbers on the corresponding date in 1917 being shown in brackets) :—Horses, 378,991 (373,600) ; cattle, 2,888,214 (2,575,230) ; milch cows, 797,569 (777,439) ; pigs, 258,269 (283,770). The number of sheep on the 30th April, 1918, was 26,538,302, against 25,270,386 on the 30th April, 1917. (*Inter-*

Agricultural Conditions in England and Wales on 1st December.

THE Crop Reporters of the Board, in reporting on agricultural conditions in England and Wales on the 1st December, state that the weather during November has been fairly favourable for autumn work, though less so upon the eastern side of the country. In many districts part of the arrears have thus been made good, but the general position is still rather backward for the time of year. About two-thirds of the area intended for wheat is now reckoned to be sown, and, as compared with the 1st December last year, the area sown is from 5 to 10 per cent. less, but the situation was then more forward. Other autumn-sown crops are similarly rather behind last year. Where up, the young corn appears quite satisfactory. Owing to the general damp condition of the land, broadcasting of wheat has been adopted rather more frequently than usual.

The potato harvest has been practically completed in most parts of the country; rather more disease has come to light, and there are some reports that the tubers are not in all cases keeping well. Roots are of quite satisfactory quality generally, but their condition is often dirty. The yield of potatoes, 6·6 tons per acre, is equal to that of last year, and one-third of a ton above the average. The total production amounts to 4,209,000 tons, by far the largest ever raised, and 868,000 tons, or more than 25 per cent., above last year's record. Turnips and swedes show a yield just over average, 13·2 tons per acre, and more than half-a-ton above last year; the total production, however, owing to the reduced acreage, amounts to 12,018,000 tons, and is a little below last year's total. Mangolds, with 20·6 tons per acre, are about 1 ton above average, but 1½ tons below last year; the total production amounts to 8,231,000 tons, which, although a quarter of a million tons less than in 1917, is, apart from last year, the highest since 1912.

Live stock have done only moderately well during the month, partly owing to the shortage of artificial feeding stuffs. Prospects for winter keep are on the short side in many parts of the country.

Labour is still short, but the situation is, if anything, very slightly easier than a month ago, though influenza has been responsible in many places for delay, both in pulling roots and sowing corn.

Agricultural Labour in England and Wales during November.

THE following local summaries give further details regarding agricultural conditions in the different districts of England and Wales:—

Northumberland, Durham, Cumberland, and Westmorland.—Labour is still very deficient, and in Cumberland the influenza epidemic has added to the difficulty.

Lancashire and Cheshire.—The supply of labour is deficient, but most of the work has been got through.

Yorkshire.—The supply of labour varies, though there is usually about sufficient, in a few districts there is some difficulty in carrying on.

Shropshire and Stafford.—The supply of labour is still short, but there seems to be some improvement.

Derby, Nottingham, Leicester, and Rutland.—Skilled labour is still scarce, but prisoners of war have been of use, and school children have helped with potato lifting.

Lincoln and Norfolk.—The supply of labour, practically throughout the division, is deficient, partly owing to so many men being laid up with influenza.

Suffolk, Cambridge, and Huntingdon.—The supply of labour is still short.

Bedford, Northampton, and Warwick.—The supply of labour is improving, and with few exceptions is sufficient to meet present requirements.

Buckingham, Oxford, and Berkshire.—Conditions are much the same as last month. The prevailing illness has caused shortage in some districts.

Worcester, Hereford, and Gloucester.—Labour is still scarce, especially skilled hands, but there is an improvement in some districts. Women and children have helped materially in the lifting of potatoes and roots, and the necessary work is being done.

Cornwall, Devon, and Somerset.—The supply of labour is still short, especially skilled hands, but much assistance has been given by women and soldiers.

Dorset, Wiltshire, and Hampshire.—The supply of labour is still short, but much assistance has been given by women, soldiers, and prisoners of war.

Surrey, Kent, and Sussex.—The supply of labour, particularly skilled hands, is still short, but the deficiency has been met to some extent by the aid of women, soldiers, and prisoners of war.

Essex, Hertford, and Middlesex.—The supply, though often short, is not generally seriously deficient.

North Wales.—The supply is usually sufficient, though short in a few districts.

Mid Wales.—The supply of labour, though sometimes scarce, is about sufficient as a rule. Women have assisted greatly with potato and mangold pulling.

South Wales.—In some places the situation is easier, in others labour is seriously scarce, and work behindhand. In most cases the usual outside help has met the need.

AVERAGE PRICES of **British Wheat, Barley, and Oats** at certain Markets during the Month of November, 1916, 1917, and 1918.

—	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	71	10	72	1	73	9	62	2	61	6	61	7	37	5	47	7	65	1
Norwich ...	68	3	70	6	72	3	57	11	60	3	60	9	37	0	41	10	57	5
Peterborough	69	1	69	8	72	2	59	7	60	0	60	7	36	9	41	0	47	7
Lincoln ...	68	8	70	4	72	4	59	9	60	3	61	4	37	5	42	4	61	8
Doncaster ...	67	2	70	0	71	11	57	3	58	9	59	10	35	4	41	0	53	7
Salisbury ...	71	4	69	9	72	1	60	4	60	3	60	8	36	8	41	7	53	4

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
" 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
" 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
" 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
" 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
" 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
" 23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
" 9 ...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
" 16 ...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
" 23 ...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
" 30 ...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl. 6 ...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
" 13 ...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
" 20 ...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
" 27 ...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May 4 ...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
" 11 ...	55	5	78	0	73	5	53	5	64	11	56	6	33	1	55	2	47	6
" 18 ...	55	0	77	11	73	4	52	10	64	10	56	6	33	0	55	2	46	4
" 25 ...	54	7	78	0	73	3	52	9	64	9	56	6	33	4	54	11	47	8
June 1 ...	53	3	78	0	73	8	53	9	65	11	60	0	33	3	54	11	44	9
" 8 ...	51	2	78	0	73	11	52	8	67	7	59	2	32	7	55	0	45	5
" 15 ...	48	10	78	2	74	3	50	9	75	6	57	9	32	1	55	1	45	7
" 22 ...	47	6	78	1	74	4	49	10	75	0	58	5	31	3	55	2	47	8
" 29 ...	46	3	78	3	74	4	49	1	73	11	57	10	30	10	55	1	46	4
July 6 ...	46	3	78	1	74	4	45	6	69	5	61	7	30	8	55	2	46	10
" 13 ...	48	11	78	2	74	4	47	5	70	10	57	5	31	6	55	1	47	0
" 20 ...	51	6	78	3	74	3	48	8	72	1	60	5	32	3	55	2	45	4
" 27 ...	53	5	78	3	74	3	47	2	65	7	56	11	32	5	55	2	46	2
Aug. 3 ...	55	1	78	2	74	3	46	1	73	6	57	1	32	9	55	0	45	10
" 10 ...	56	7	78	4	74	7	46	11	76	1	57	7	31	2	55	0	46	3
" 17 ...	58	1	78	7	74	2	48	0	68	11	61	4	30	8	55	6	55	11
" 24 ...	59	0	76	7	74	8	47	1	70	7	62	6	31	6	54	7	56	9
" 31 ...	59	4	72	1	74	8	48	5	60	4	60	1	30	5	49	0	57	11
Sept. 7 ...	59	3	71	6	72	3	51	7	59	3	60	4	31	1	46	7	56	9
" 14 ...	59	11	70	7	72	5	52	6	57	2	60	1	30	9	45	0	49	2
" 21 ...	59	4	70	8	72	6	53	3	56	10	60	4	30	9	45	8	49	11
" 28 ...	58	10	70	6	72	7	54	1	58	5	60	3	31	1	44	7	50	3
Oct. 5 ...	59	2	70	8	72	8	54	5	57	9	60	3	30	9	44	9	50	9
" 12 ...	59	7	71	0	72	6	53	10	58	5	60	3	31	6	44	5	51	6
" 19 ...	60	9	70	8	72	7	53	8	59	3	60	3	31	11	44	1	50	9
" 26 ...	62	10	70	10	72	5	54	6	60	1	60	3	32	10	43	0	50	5
Nov. 2 ...	66	7	70	4	72	4	56	2	59	11	60	3	34	0	42	4	50	8
" 9 ...	69	8	70	3	72	4	58	0	60	2	60	3	35	8	42	11	49	11
" 16 ...	70	9	70	3	72	5	59	8	60	2	60	3	37	8	43	0	49	10
" 23 ...	70	8	70	2	72	4	61	8	59	9	60	10	39	7	43	1	51	1
" 30 ...	71	3	70	2	72	3	63	1	59	3	62	2	41	4	44	6	50	4
Dec. 7 ...	72	1	70	7	72	4	65	6	58	7	62	6	44	1	43	5	51	4
" 14 ...	73	2	71	2			66	5	58	0			45	10	43	6		
" 21 ...	74	8	71	1			67	3	57	7			46	5	44	2		
" 28 ...	75	10	71	1			67	5	57	7			47	4	44	10		

NOTE.—Returns of purchases by weight or weighed measure are converted to Oats,

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in November and October, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	November. First Grade.	November. Second Grade.	October. First Grade.	October. Second Grade.
FAT STOCK :—	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	74 10	70 3	75 4	70 1
Herefords	74 11	69 10	75 2	70 0
Shorthorns	74 9	69 10	75 0	70 0
Devons	74 9	69 9	75 2	70 1
Welsh Runts	74 10	—	—	—
Fat Cows	69 11	62 0	70 0	62 1
	First Quality. per lb.* d.	Second Quality. per lb.* d.	First Quality. per lb.* d.	Second Quality per lb.* d.
Veal Calves	12	11	12½	10¾
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	58 4	46 0	56 19	44 16
,, —Calvers ...	50 18	40 19	50 11	40 11
Other Breeds—In Milk ...	50 10	40 5	52 5	40 6
,, —Calvers ...	—	—	—	—
Calves for Rearing	3 12	2 11	3 15	2 15
Store Cattle :—				
Shorthorns—Yearlings ...	16 15	13 16	17 8	14 16
,, —Two-year-olds...	26 11	22 3	27 2	23 3
,, —Three-year-olds	34 1	30 9	34 17	30 18
Herefords—Two-year-olds...	29 2	25 15	28 5	24 16
Devons— ,,	26 17	22 16	25 19	22 6
Welsh Runts— ,,	25 14	21 12	26 1	22 8
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	58 4	46 9	59 11	47 10
Store Pigs :—				
8 to 12 weeks old	26 4	16 7	32 0	22 0
12 to 16 ,, ,, ...	54 0	38 10	66 1	48 7

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins, which during November made prices equivalent to an additional 1¼d. per lb. of the carcass weight for Downs, Longwools, and Cross-breds, and 1¼d. for Cheviots, Blackfaced and Welsh, and during October 1½d. per lb. for Downs, Cheviots, and Cross-breds, 1¼d. for Longwools, and 1d. for Blackfaced and Welsh.

* In addition to the price quoted above for sheep per lb., sellers were entitled, under the Live Stock (Sales) Order, 1918, to charge during November an extra amount ranging 6d. to 1s. 8d. per head, according to the weight of the sheep.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in November, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF :—						
English	1st	133 0	133 0	—	133 0	133 0
	2nd	133 0	133 0	—	133 0	133 0
Cow and Bull	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	112 0	116 6	112 0
Irish : Port Killed ...	1st	—	—	133 0	133 0	133 0
	2nd	—	—	121 6	133 0	121 6
Argentine Frozen—						
Hind Quarters ...	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
American Frozen—						
Hind Quarters ...	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
Canadian Frozen—						
Hind Quarters ...	1st	—	—	—	—	—
Fore ,, ...	1st	—	—	—	—	—
VEAL :—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	112 0	93 6	93 6	93 6	93 6
Foreign	1st	—	—	—	—	—
MUTTON :—						
Scotch	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
English	1st	140 0	140 0	—	140 0	140 0
	2nd	140 0	140 0	—	140 0	140 0
Irish : Port Killed ...	1st	—	—	140 0	—	140 0
	2nd	—	—	140 0	—	140 0
Argentine Frozen ...	1st	—	—	—	140 0	—
New Zealand ,, ...	1st	—	—	—	140 0	—
Australian ,, ...	1st	—	—	—	—	—
LAMB :—						
British	1st	140 0	140 0	—	—	—
	2nd	140 0	140 0	—	—	—
New Zealand	1st	—	—	140 0	140 0	140 0
Australian...	1st	—	—	—	—	—
Argentine...	1st	—	—	140 0	140 0	140 0
PORK :—						
British	1st	—	168 0	168 0	168 0	168 0
	2nd	—	—	—	168 0	—
Frozen	1st	—	—	—	—	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in November, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.	s. d. per 12 lb.
BUTTER:—						
British	—	—	—	—	27 6	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE:—						
British—						
Cheddar	*163 6*	—	—	—	*163 6*	—
Cheshire	—	—	120 lb. 175 0	—	120 lb. 175 0	—
Canadian	163 6	—	per cwt. 163 6	—	per cwt. 163 6	—
BACON:—						
Irish (Green)	199 6	—	199 6	—	199 6	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS:—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS:—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British...	—	—	—	—	74 4	71 10
Irish	63 6	—	61 0	58 6	68 6	66 0
Egyptian	—	—	—	—	—	—
POTATOES:—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen ...	*141 6*	*140 0*	—	—	*145 0*	*142 6*
Arran Chief	141 6	140 0	141 6	138 6	145 0	142 6
Edward VII.	180 0	172 6	176 6	175 0	173 6	171 0
HAY:—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

Disease.	November.		Eleven Months ended November.	
	1918.	*1917.*	*1918.*	*1917.*
Anthrax:—				
Outbreaks	21	29	225	392
Animals attacked	24	33	259	447
Foot-and-Mouth Disease:—				
Outbreaks	—	—	3	—
Animals attacked	—	—	14	—
Glanders (including **Farcy**):—				
Outbreaks	4	2	31	25
Animals attacked	16	7	92	53
Parasitic Mange:—				
Outbreaks	302	221	4,026	2,257
Animals attacked	498	356	7,498	4,215
Rabies:—				
Number of cases	40	—	86	—
,, ,, Dogs affected ...	39	—	83	—
,, ,, other animals affected	1	—	3	—
Sheep-scab:—				
Outbreaks	39	37	304	457
Swine Fever:—				
Outbreaks	120	125	1,300	2,013
Swine slaughtered as diseased or exposed to infection	63	33	526	851

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

Disease.	November.		Eleven Months ended November.	
	1918.	1917.	1918.	1917.
Anthrax:—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy):—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange:—				
Outbreaks	3	—	95	41
Sheep-scab:—				
Outbreaks	40	53	296	376
Swine Fever:—				
Outbreaks	4	5	28	196
Swine slaughtered as diseased or exposed to infection	53	20	129	1,127

The Weather in England during September.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff from Average
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 7th Sep.								
England, N.E. ..	54·0	—1·9	0·65	17	+ 6	4	4·4	—0·6
England, E. ..	56·5	—1·2	0·83	21	+ 9	5	4·9	—0·4
Midland Counties	54·9	—1·8	1·43	36	+24	6	4·3	—0·5
England, S.E. ..	58·7	—0·1	1·00	25	+10	4	6·3	+0·7
England, N.W. ..	54·2	—2·1	1·23	31	+15	5	4·2	—0·8
England, S.W. ..	57·1	—0·5	1·32	34	+17	5	4·9	—0·4
English Channel	61·7	+1·2	1·05	27	+13	5	7·2	+1·0
Week ending 14th Sep.								
England, N.E. ..	52·4	—2·7	1·25	32	+25	6	5·4	+0·5
England, E. ..	54·9	—1·9	1·01	26	+17	7	5·6	+0·2
Midland Counties	53·6	—2·1	1·75	44	+36	7	5·1	+0·3
England, S.E. ..	56·2	—1·8	1·56	40	+32	7	5·3	—0·5
England, N.W. ..	52·9	—2·8	2·20	56	+43	7	4·2	—0·5
England, S.W. ..	54·9	—1·9	2·36	60	+48	7	4·7	—0·6
English Channel	57·8	—1·9	1·33	34	+23	6	5·8	—0·8
Week ending 21st Sep.								
England, N.E. ..	54·7	+0·9	1·89	48	+39	6	4·3	0·0
England, E. ..	58·1	+2·5	1·36	35	+26	5	5·6	+0·6
Midland Counties	55·6	+1·2	1·98	50	+40	6	3·9	—0·4
England, S.E. ..	58·5	+1·9	1·60	41	+31	5	5·5	+0·2
England, N.W. ..	54·2	—0·3	3·18	81	+67	7	3·3	—1·0
England, S.W. ..	56·9	+1·0	2·11	54	+40	7	3·4	—1·6
English Channel	59·8	+0·9	1·34	34	+22	5	4·6	—1·8
Week ending 28th Sep.								
England, N.E. ..	50·8	—2·1	0·47	12	0	5	5·5	+1·4
England, E. ..	52·4	—1·6	0·27	7	— 7	4	5·9	+1·1
Midland Counties	51·5	—1·6	0·49	12	— 1	5	5·3	+1·3
England, S.E. ..	53·1	—2·1	0·76	19	+ 4	4	6·2	+1·4
England, N.W. ..	51·6	—1·6	1·37	35	+15	7	4·5	+0·6
England, S.W. ..	52·2	—2·3	0·97	25	+ 4	6	4·5	+0·4
English Channel	55·6	—2·1	0·81	20	+ 1	6	4·9	—0·1

* One inch=25·4 millimetres.

The Weather in England during October.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.	Rainfall. Amount.	Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 5th Oct.								
England, N.E. ..	48·4	—2·8	0·57	15	0	6	3·1	—0·5
England, E. ..	47·0	—5·4	1·43	36	+23	4	2·8	—1·0
Midland Counties	47·3	—3·6	1·14	29	+15	6	2·7	—0·6
England, S.E. ..	47·9	—5·4	1·10	28	+10	4	3·7	—0·2
England, N.W. ..	49·0	—2·7	1·49	38	+17	6	2·6	—0·8
England, S.W. ..	48·6	—4·3	1·75	45	+21	6	3·5	—0·3
English Channel	52·2	—3·6	0·79	20	— 1	5	5·1	+0·7
Week ending 12th Oct.								
England, N.E. ..	50·4	+0·9	0·64	16	— 2	6	3·2	—0·1
England, E. ..	50·8	0·0	0·93	24	+ 8	5	2·4	—1·3
Midland Counties	50·2	+0·7	0·63	16	— 3	5	3·2	0 0
England, S.E. ..	52·2	+0·3	0·81	21	+ 2	6	2·5	—1·2
England, N.W. ..	50·2	0·0	1·19	30	+ 8	5	3·6	+0·6
England, S.W. ..	51·5	0·0	1·19	30	+ 3	6	4·0	+0·6
English Channel	54·2	—0·5	1·10	28	+ 5	7	3·7	—0·7
Week ending 19th Oct.								
England, N.E. ..	46·1	—2·3	0·72	18	0	4	1·4	—1·5
England, E. ..	46·8	—2·7	0·47	12	— 3	5	2·0	—1·2
Midland Counties	45·9	—2·1	0·35	9	— 8	4	2·1	—0·8
England, S.E. ..	46·8	—3·9	0·39	10	— 9	4	2·9	—0·5
England, N.W. ..	47·3	—1·8	0·66	17	— 5	6	2·8	+0·1
England, S.W. ..	46 8	—3·7	0·54	14	—11	5	4·1	+0·8
English Channel	50·8	—3·2	1·23	31	+ 8	5	4·6	+0·5
Week ending 26th Oct.								
England, N.E. ..	46·6	+0·1	0·21	5	—13	3	2·2	—0·4
England, E. ..	47·2	0·0	0·33	8	— 8	4	1·6	—1·2
Midland Counties	46·1	0·0	0·20	5	—12	4	1·5	—1·0
England, S.E. ..	49·5	+0·9	0·40	10	—12	4	2·3	—0·8
England, N.W. ..	46·3	—0·5	0 12	3	—20	2	2·5	—0·1
England, S.W. ..	48·1	—0·5	0·22	6	—21	4	1·6	—1·3
English Channel	52·4	0·0	0·68	17	—11	5	2·0	—1·4

* One inch=25·4 millimetres.

The Weather in England during November.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 2nd Nov.								
England, N.E. ..	51·3	+5·2	0·24	6	— 9	2	1·1	—1·1
England, E. ..	51·3	+4·3	0·17	4	—12	3	0·9	—1·7
Midland Counties	51·1	+5·4	0·35	9	— 9	2	1·0	—1·2
England, S.E. ..	52·9	+4·5	0·72	18	— 5	5	1·4	—1·4
England, N.W. ..	51·7	+4·8	0·64	16	— 8	4	1·1	—1·1
England, S.W. ..	52·0	+3·7	0·98	25	— 4	6	0·9	—1·6
English Channel	54·2	+2·5	0·70	18	— 6	6	1·7	—1·4
Week ending 9th Nov.								
England, N.E. ..	43·4	—1·4	0·69	17	+ 3	4	3·4	+1·3
England, E. ..	44·6	—0·7	1·19	30	+17	4	3·2	+0·7
Midland Counties	42·7	—1·8	0·86	22	+ 5	4	3·5	+1·6
England, S.E. ..	45·5	—0·7	1·26	32	+11	4	2·5	+0·1
England, N.W. ..	44·5	—1·2	0·66	17	— 6	5	2·8	+1·0
England, S.W. ..	44·8	—2·3	1·23	31	+ 3	5	4·6	+2·3
English Channel	49·9	—1·0	0·94	24	— 4	5	3·8	+1·2
Week ending 16th Nov.								
England, N.E. ..	41·4	—1·2	0·02	1	—13	1	2·7	+0·8
England, E. ..	42·3	—0·9	0·06	2	—13	2	3·5	+1·3
Midland Counties	40·0	—2·1	0·04	1	—13	1	3·0	+1·0
England, S.E. ..	44·1	—0·3	0·09	2	—15	2	3·8	+1·5
England, N.W. ..	41·8	—1·6	0·37	9	—11	1	3·2	+1·3
England, S.W. ..	44·8	—0·3	0·15	4	—18	2	3·3	+0·9
English Channel	48·6	—0·3	0·01	0	—22	1	4·8	+2·1
Week ending 23rd Nov.								
England, N.E. ..	36·7	—4·8	0·02	1	—18	1	1·8	0·0
England, E. ..	38·5	—3·0	0·02	1	—10	2	2·5	+0·7
Midland Counties	36·0	—5·2	0·03	1	—10	1	1·4	—0·1
England, S.E. ..	39·8	—3·2	0·02	1	—13	1	2·7	+1·0
England, N.W. ..	37·8	—4·6	0·02	1	—19	1	2·5	+0·9
England, S.W. ..	40·7	—3·4	0·06	2	—19	2	2·3	+0·4
English Channel	44·1	—3·9	0·09	3	—16	2	3·1	+1·1
Week ending 30th Nov.								
England, N.E. ..	42·5	+1·0	0·42	11	— 4	6	0·6	—0·9
England, E. ..	43·2	+1·8	0·53	13	— 2	6	0·5	—1·0
Midland Counties	43·2	+2·3	0·51	13	— 4	6	0·6	—0·7
England, S.E. ..	45·0	+1·9	0·55	14	— 4	6	0·9	—0·7
England, N.W. ..	43·9	+1·4	0·90	23	— 1	6	0·9	—0·4
England, S.W. ..	47·0	+3·0	0·99	25	— 1	6	0·9	—0·8
English Channel	50·6	+3·0	1.55	39	+14	7	1·1	—0·8

* One inch = 25·4 millimetres.

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EDITORIAL NOTES.

Land Settlement.

DURING the last few months a very great deal has been said and written on the question of the settlement of ex-Service men on the land. There would seem to be no doubt that there is a very fair percentage of men serving in the Army who are desirous of settling on the land rather than of returning to their previous work, much of which, by the way, is now being efficiently done by women, particularly where clerical, shop and factory work is concerned. Steps of a far-reaching nature are being taken to assist the men involved, not only as regards preliminary instruction before demobilisation and training after demobilisation, but in relation to the actual provision of holdings after the men have had practical experience of agriculture through employment with good farmers. The War Office, the Board of Agriculture, the Food Production Department, the Ministry of Labour, the Department of Demobilisation, and the County Councils are co-operating to provide reasonably good instruction and training, to facilitate the discharge of the men, to secure employment with experienced farmers for those concerned, and to provide land for settlement in due course.

Attention is particularly directed to the article on Land Settlement in the Mother Country at p. 1152, and to the Notices at pp. 1242 and 1243. Literature on Land Settlement can be obtained on application to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

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Increased Production.

THE shortage of supplies of the more important foodstuffs makes it essential that there should be no slackening of effort on the part of all producers to ensure in the years which are to come increased production over the year which has gone. Total crop production may be increased in several ways—by an extension of the arable acreage, which is gradually taking place; by increasing the average yields per acre—by a

conservation and use of farmyard dung and liquid manure; by combating insect, fungus and other pests of crops; by thorough and clean tillage; by the use of the best tillage implements; by draining; by liming; by the use of high quality seeds and prolific varieties; by the use of clovers and green fodder crops; and by a general effort to improve grass land of all types. Average yields, in particular, are capable of considerable improvement, and farmers might usefully note the results recorded (p. 1161) by Mr. Arthur Amos, relative to yields of wheat grown on three fields in Kent last year. The yield of 64 bush. per acre on an area of 15½ acres in 1916 (p. 1162) must be regarded as excellent, but this yield was exceeded in the same field in 1918 by 8 bush. per acre, while in other fields of about 8 acres and 3½ acres the yields were 76 bush. and 96 bush. per acre respectively. Particular attention was devoted to the variety to be sown and that chosen was Yeoman, produced at Cambridge by Professor Biffen. The details of the method of growing such phenomenal crops on three fields will prove of interest to all wheat growers.

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IN the extracts from speeches of the Prime Minister, given at p. 1190, occurs the following passage:—

Land Reclamation and Drainage.

"You must have reclamation of waste land. That cannot be undertaken by individual landowners, for the simple reason that it may not depend entirely on them. For instance, there is the draining. It is no use your draining one part if you know that the next part is not drained.

Reclamation has got to be a connected effort directed by the State, and at the present moment there are hundreds of thousands of acres that, on investigation, have been demonstrated to be capable of being reclaimed."

Drainage and land reclamation go hand in hand, thorough drainage alone going far to reclaim some areas, while other areas under treatment must also be drained if success is to be ensured. Various advances have been made from time to time from the Development Fund for the purpose of enabling reports to be made on areas extending to many thousands of acres which are considered capable of reclamation (*e.g.* see p. 1189). The Board are now conducting inquiries with a view to initiating drainage authorities upon a number of rivers, the object being to improve the main drainage of land for agricultural purposes. On many rivers and drainage areas in England and Wales a considerable amount of clearance has already been done by means of prisoners of war, and marked improvements have been effected. In other cases remarkable results have

been achieved at comparatively small cost, and figures given elsewhere in this *Journal* (p. 1220) show that in the West Riding of Yorkshire alone the Agricultural Executive Committee have reclaimed 1,100 acres and improved 64,977 acres, the individual figures being most striking. Notes on land drainage appear at pp. 1218 and 1220; the Land Drainage (Constitution of Authority) Regulations, 1919, are given at p. 1226; and an official notice concerning the need for clear drainage outlets is printed at p. 1228. Articles on the reclamation and cultivation of waste or unimproved land have recently appeared in this *Journal* as follows:—Poverty Bottom: An Experiment in Increased Food Production, February, 1918, page 1186; Baynard's Estate, Cranleigh: An Example of a War Committee's Efforts to Increase Food Production, April, 1918, p. 17; A War-time Food Production Effort in Lancashire, September, 1918, p. 576; and Floods and Waterlogged Land, November, 1918, p. 961.

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Preservation of Farmyard Manure.

THERE are even at the present day, and despite the lessons of the War, too many cases in which farmers exercise no care in dealing with farmyard manure and the liquids which drain from the byres and from the dung heap. The importance of the dung heap was dealt with in the "Notes on Manures" in the issue of this *Journal* for November last, p. 977, and in the present number a brief article (p. 1197) deals with the subject and gives simple rules for conserving farmyard manure. Farmers might feel stimulated to devote special attention to the preservation of both solid and liquid manure if they would consider for a moment what reply they would be compelled to make to the question: "Where do these materials come from in the first place?" In answering such a question farmers will not forget that farmyard manure represents the residue, after consumption or use for litter by their stock, of (1) crops grown on the farm at considerable expense, and (2) purchased feeding stuffs of very high value. It is clear that these residues are in themselves of considerable money value for manurial purposes, owing to their content of nitrogen, phosphoric acid and potash, as well as because of the bulk of carbohydrate matter they add to the soil. Unless, therefore, farmers are slack in their views on economy, and too freely permit waste, they will make really strenuous efforts to conserve, and utilise to the full on their farms, every hundredweight of the manurial residues from the food fed to their stock and the litter trodden

LAND SETTLEMENT IN THE MOTHER COUNTRY.

THE English and Scottish Boards of Agriculture have issued, with the approval of the Admiralty and the War Office, a booklet entitled "Land Settlement in the Mother Country." The object of the booklet is briefly to explain the steps that have been, or will be taken to settle ex-Service men on the land after the War, and to explain impartially the prospects of success and what qualifications ought to be possessed by those who desire to take up farming or market gardening in the Mother Country.

The Committee appointed by the Government in the early days of the War to consider the question of the employment or settlement of ex-Service men on the land recorded their opinion that it was only right and fitting that those men who had answered the call of their King and Country should be encouraged and assisted to find occupation on the land for which they had fought, provided such conditions could be ensured as would offer them a reasonable prospect of success.

SETTLEMENT ON THE LAND.—At the close of the War, Great Britain is more nearly in the position of a self-supporting country than she has been for the last forty years. The menace of the submarine campaign, by which Germany hoped to bring Great Britain to her knees, has been warded off no less by the exertions of the agricultural community than by the heroism of the British Navy.

The immediate danger is now past, but the experience gained in the course of the War cannot be neglected. The production of the largest amount of food from the soil of the Mother Country is recognised as being one of the first national interests, and it is the desire and intention of His Majesty's Government to maintain and extend, as far as possible, the revival of agriculture brought about by the necessities of war. In order that the land may be put to the fullest possible use for the benefit of the nation as a whole, it is necessary that as many individuals as possible should have a direct interest in the cultivation of the soil, and steps are being taken to provide for the settlement on the land, either as owners or occupiers, of men possessing the necessary experience and qualifications

The conditions of agricultural life are already widely different from what they were before the War broke out. As a result of war emergency measures one and a half million acres of grass land have been ploughed up and are now producing corn and other crops. The increased area under the plough will mean an increased demand for agricultural labour, and it is confidently anticipated that, great as is the change that has already been made, much greater progress in the same direction will be necessary if full use is to be made of the land.

In the first place, the position of the agricultural labourer has been largely improved. In every county of the Kingdom Wages Boards have been established, and the agricultural labourer has the assurance of a due reward for his toil. In no county of England and Wales has a lower rate than 30s. for a week of 54 hours in summer and 48 hours in winter been fixed for any labourer over 18 years of age.

A man who has had no previous experience or training in agricultural work, but, for various reasons, is desirous of settling on the land after demobilisation, will require experience in the particular kind of agricultural work to which he wishes to devote himself before he can hope to maintain himself upon a small holding. Such experience can be best secured by *obtaining employment with a good farmer,* as practical knowledge of the various agricultural operations can thus be acquired. Training facilities for a limited number of such men may be available on one of the Board's Farm Colony Settlements referred to in a later paragraph, and it is hoped to extend the opportunities of training in other ways.

The Government intend to provide a certain number of "cottage holdings," that is to say, a cottage with a small area of land for market gardening, or a few acres of grass land, attached.

These holdings are intended for ex-Service men who, while working for wages, are desirous of cultivating a small piece of land in their spare time. Such holdings should afford a good beginning for those who possess only a limited amount of capital, and may form a stepping-stone to a small holding.

It will, however, be a legitimate ambition on the part of an agricultural labourer to rise through the intermediate stage of a small holder to the position of a farmer, and it is the intention

of the Government to provide every facility for an ex-Service man who is ambitious to rise in the agricultural industry.

The system of farming land in small holdings is by no means new. They have always held a most important place in English agriculture, as is shown by the fact that at the present time there are 278,556 agricultural holdings in England and Wales of from 1 to 50 acres in extent, representing 65 per cent. of the total number of holdings.

It will be seen, therefore, that agriculture presents openings for ex-Service men, whether they intend to work as ordinary wage earners or, if found suitable, as small holders. Those who intend to start for the first time should, however, weigh carefully their prospects. They should bear in mind the fact that, while agricultural employment will provide healthy surroundings, plenty of good food, a garden and good conditions for the children, yet there will be less amusement than is afforded by life in a town. For this reason the ex-Service man will probably desire, first, to make sure that his wife, if he has one, wishes to live in the country and will take a share in the work of any holding with which he may be provided.

Shortly, the openings offered in agriculture in England and Wales to ex-Service men are as follows :—

1. **Labourer.**—Good wages; house and garden or grazing ground; healthy employment.
2. **Small Holder.**—Suitable land on reasonable terms, with the prospect of making a living, with a prospect of improvement, provided he and his family are prepared to work hard.
3. **Colonist.**—Establishment on the land with other settlers on a commercial and co-operative basis, either as individual small holders or as members of a community sharing the profit derived from the working of the Colony as one large farm. Facilities for hiring machinery, implements, etc., from Central Farm. Benefit of advice and assistance from Director.

SMALL HOLDING COLONIES.—The Board of Agriculture and Fisheries have acquired four Estates at Patrington, East Riding of Yorkshire; Holbeach, Lincs; Heath Hill, Salop; and Pembrey, Carmarthen, for the purpose of giving a trial to the land settlement of ex-Service men under a colony system,* the

Colony at Pembrey being intended for Welshmen. The Board have power to acquire additional land, not exceeding a further 54,000 acres, for the purpose.

The distinctive feature of such a system is that it is founded on a communal and co-operative basis in order to provide social life for the settlers, the organised buying and selling of produce, and the joint use of horses, implements and machinery. It is proposed that the settlers should work on a Colony either as individual small holders or as members of a community which would share the profits derived from working the Colony as one large farm. There are thus two kinds of Colony, each with a distinct method of working. These methods may be described as the "small-holding" and the "profit-sharing" systems.

(1) **The Small-Holding System.**—Under the "small-holding" system, the Colony will begin as one large farm under the management of a Director. Selected applicants will usually be employed as workers upon it, at the rate of wages current in the district, for such period of probation as may be found necessary, and at the end of that period any approved applicant desiring it will be allotted, at a reasonable but economic rent, such area of land as he appears likely to be able to cultivate successfully on his own account. If this area is not sufficient to enable a settler to obtain a complete living from his holding, he will be at liberty to fill in his time by continuing to work for wages either on the undivided portion of the Colony or other farms in the district, and he will be allotted further land as his growing ability and capital justify such addition, until he has an area which, when cultivated on the best system, will be large enough to support him entirely.

Even when all the small holdings have been taken up, a certain portion of the estate will be retained as a Central Farm under the management of the Director, and will be equipped with sufficient machinery, implements, horses, etc., to be let on hire to settlers requiring them.

The assistance and advice of the Director on all matters connected with the management of their holdings and the disposal of their produce will be available to the settlers.

A co-operative depot will be established for each Colony through which settlers will be able to purchase their requirements, both agricultural and domestic, and also to dispose of their produce.

The Government have not hitherto made any direct advances of capital to ex-Service men desirous of taking up holdings, but it is hoped that industrious men, even if possessed of insufficient capital to take a whole-time holding, by starting as workers on the Central Farm, and at the same time cultivating a small acreage on their own account, may gradually be able to increase the area under their own control, until they are able to support themselves entirely from that source.

In the selection of settlers for the Colonies, preference will be given, as between men of equal capital, merit and qualifications, to those whose wives or other relatives have, as the result of their employment on the land either before or during the War, acquired some knowledge of farm work.

(2) **The Profit-sharing System.**—Under this system a Colony will be managed by a Director as one farm, the settlers being employed by him at the current rate of wages for the district, but receiving in addition a share of any profits arising out of the farming operations.

Each settler, however, will be provided, if desired, with about half an acre of land adjoining or near to his cottage, any surplus produce from which he will be helped to sell.

The working of the system may be briefly described as follows :—

The profits, after the current rate of interest (*e.g.*, 5½ per cent.) on capital, and the working expenses of the farm, the rent, rates, repairs and other annual charges had been paid, and after allocating a percentage to a reserve fund, would be divided between capital, management and labour, in proportion to the amounts that had already been paid out to them in the working account. In other words, each settler would receive a dividend on the amount of his wages for the year.

Settlers on the Colony would be entitled to invest any portion of their dividend or share of the profits in the form of shares in the capital of the farm. These shares would be entitled to interest at the rate prevailing (*e.g.* 5½ per cent.), and settlers would also be allowed to invest their other capital in the farm at the same rate. When settlers holding such share capital left the farm, or on death, the capital would be repaid.

Forms of application for holdings on these Colonies can be obtained from the Secretary, Board of Agriculture and

COUNTY COUNCIL SMALL HOLDINGS.—The great majority of the small holdings available for ex-Service men will have to be provided by the County Councils, and **any man who desires to obtain, after demobilisation, a Small Holding of not more than 50 acres in England or Wales, should fill up the Form* printed in the middle of the booklet.** ***If the man is a Soldier or Airman, he should hand the Application Form to his Commanding Officer for transmission to the Clerk of the County Council, at the County Town of the County in which he wishes to settle. If the man is a Sailor he should forward the Application Form direct to the Clerk of the County Council. Any man already demobilised or released from the Forces, should also forward the Application Form direct.*** Men who have previous agricultural experience and sufficient capital will naturally be given the preference, but the Government are hoping that men without sufficient capital of their own will either be provided with fully-stocked holdings or with loans to assist them in purchasing the necessary stock and implements. The amount of capital required for an ordinary small holding would not be less than £12 an acre, and in the case of a small fruit or market-garden holding a larger amount per acre is necessary.

As explained on page 1160 a considerable time (a year or more) may often elapse before small holdings can be secured and equipped with the necessary buildings, and whilst every effort will be made to provide holdings as quickly as possible for those who apply, men are strongly advised to secure temporary employment on the land in the meantime.

GENERAL INFORMATION as to Small Holdings in Great Britain.—Cultivation and Conditions on which they will be provided.—The attention of those who are making application for small holdings under any of the above heads is directed to the following points:—

That the experience of the Boards of Agriculture and the Small Holdings Committees has shown that small holders have, in most cases, been highly successful in the past,† and under conditions which were much less favourable for success in agriculture than those which are likely to obtain for many years to come. But, as many of those who have been serving at the front in France and Belgium must have observed, the system prevailing in those countries of intensive cultivation or *petite culture* depends for its success on the skill, hard work and energy displayed by the small holder himself, assisted by the members of his family. Ex-Service men are, therefore, advised, before they send in an application for a small holding,

* Not reproduced here. † See also note on p. 1215.

:o consider their prospects carefully, and to assure themselves :hat they possess the necessary qualifications, industry and letermination to enable them to carry through in an occupa-ion which, whilst affording many advantages, must by its /ery nature be subject to occasional disappointments through ınfavourable seasons and other causes over which they can :xercise no control. Further, every man should make sure :hat his wife, if he has one, is ready to share the conditions of 'ural life, and that she is prepared to assist him in many of the ninor operations on the holding.

One word of special caution is necessary. Many men think hat *poultry keeping* is a remunerative business which offers . suitable opening for those who desire to settle on the land. 'he Boards think it necessary, therefore, to state definitely hat in their opinion poultry keeping cannot be recommended .s a staple occupation. It is a useful side-line, but ex-Service nen would be most unwise to rely upon it as a means of naking a living.

The attention of those who desire to settle upon the land is lirected to the different types of farming which may be ındertaken by a small holder.

(*a*) **Mixed Farming.**—The tenants on this class of holding row corn and other crops in rotation, rear stock, and are, in act, small farmers. It will usually be found that a holding f 30 acres and upwards is necessary to enable a man to main-ain himself and a family, but the area suitable for a succesful mall holding of this type necessarily varies very much with he nature of the soil and the system of farming practised.

(*b*) **Dairy Holdings.**—As a rule it will be found that a holding f from 30 acres and upwards is similarly required to maintain . man and his family where this class of farming is followed. :xperience has shown that farms of this nature are most rofitable where, *in addition* to the pasture, a certain proportion f the holding is utilised for the growth of root and forage crops. Dairying on holdings, consisting mainly of arable land on ıe "soiling system," which entails the systematic growth f forage crops and roots, is being developed and is likely to rove of great advantage to the small holder. It should be orne in mind that, unless the milk is to be sold off the holding, he small holder's wife should possess a knowledge of dairying ı all its branches.

(*c*) **Fruit and Market Gardening.**—Land suitable for this type

can

be acquired this type of cultivation offers great advantages to a man who is determined to succeed, but it also requires a considerable amount of technical knowledge in respect of the growth and marketing of fruit and vegetables. In suitable localities where the soil and climatic conditions are favourable and there is a ready means of access to good markets, holdings of this kind may be of much smaller size than in the two cases already mentioned. Under favourable conditions where an intensive system of culture has been adopted there are numerous instances of successful undertakings on holdings of from 3 to 5 acres.

The ex-Service man who obtains a holding will be expected to undertake to cultivate it himself, the word "cultivate" meaning the use of the land for any purposes of farming or husbandry, including market gardening and fruit farming. He must not get a holding and then use it for some other purpose; his rent will be fixed at a rate which will repay the cost of acquiring the land and making it ready for his use, except that the Government propose to bear the extra cost due to the abnormal price of building at present. He will have to pay the local rates himself, and also the tenant right valuation or sum due to the outgoing tenant on entering.

Past experience has shown that most small holders prefer to rent their land in order that the capital they possess may be turned over rapidly in the cultivation of their holdings, and that the small holding may be more readily used as a stepping stone to a larger holding. If, however, a man wishes to buy a holding from a County Council, he can do so by paying one-fifth of the cost of the land and its equipment in cash. Thus if a holding should cost, say, £200, he would pay down £40, and the Council would allow him to pay off the remainder of the cost, £160, in the following way: He could pay a yearly rent for one-quarter of the balance, £40, and he could pay off three-quarters, £120, by half-yearly payments spread over a period up to 50 years, such payments to cover the interest on the amount still owing. In return for the assistance given him, a small holder would undertake not to use his holding for any purpose other than that of agriculture, as described above, for at least 20 years, and in any case not until the whole amount had been paid off.

CO-OPERATION.—Under the new conditions which have been introduced owing to the War, co-operation has been resorted to in many localities where it was previously unknown, and

there is good evidence that the principle will be greatly extended to benefit small holders, and particularly those who are engaged in fruit farming, market gardening and dairying. Co-operation, on the one hand, embraces the co-operative purchasing of such things as fertilisers, seeds, feeding-stuffs, etc., and, on the other hand, the co-operative transport and marketing of produce.

In making the choice between an agricultural or any other pursuit on demobilisation the ex-Service man is reminded that, as a consequence of the immensely increased interest in the production of home-grown food, associations for the betterment and brightening of village and rural life have been started, and that the Government is closely studying how the welfare of the agricultural population can be improved by better housing and the encouragement of rural industries.

Finally, there is every evidence of an earnest desire amongst the landowners of the country to assist the Government as far as possible by offering special facilities to ex-Service men who desire to take up any form of agriculture or agricultural employment in the Home Country. It must, however, be understood, that, whilst every effort will be made to accommodate those who are genuinely desirous of taking up farming on small holdings as a means of livelihood with the best will in the world on the part of all concerned, some little time must elapse before the whole area of land can be acquired to meet the probable demand from ex-Service men. Moreover, where new cottages and the necessary outbuildings have to be erected, this delay may be increased in consequence of the great shortage of building materials and of the absence of so many men belonging to the building trade on military service. Thus in some cases it may be necessary for men to find temporary employment on a farm until a holding has been secured and equipped for them.

DISABLED MEN.—If a man is disabled through wounds or through illness contracted whilst on active service of such a kind as to prevent him following his previous occupation, he should apply to his Local Pensions Committee for training in agriculture, as the Ministry of Pensions hope to make arrangements in appropriate cases to assist such men.

A SUCCESSFUL METHOD OF GROWING HEAVY CROPS OF WHEAT.

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WHEN corn crops are grown upon rich land the factor which most frequently limits the yield is the inability of the straw to hold up the ears; if the straw fails to stand the crop becomes laid, is very difficult and expensive to harvest, the ears never fill, and the yield is disappointing. This unfortunate result is very liable to be obtained when a wheat crop is taken upon land in such a high state of fertility as is commonly attained upon market-garden land, or upon grubbed hop land, or, again, on some of the Fen lands of the Eastern Counties.

The following characteristics are generally to be observed in the growth of wheat crops under such conditions. The crop, having been sown in October or November, germinates and begins to grow well during late autumn, its vigour is continued during the winter, and in March the crop generally looks magnificent—a dense carpet of vigorous green foliage. The experienced farmer is anxious; he knows that his crop is "winter proud" and that it is unlikely to look so well during the rest of the growing period. In April and May the foliage often loses its good colour; a closer examination shows that the leaves at this stage are covered with rust, which weakens the plant and the straw; nevertheless the stems shoot up tall and rank, only to be beaten down flat by the first thunderstorm in July.

In general practice the methods adopted to prevent this unfortunate condition are: (1) To delay sowing till late in autumn, so that the plant cannot make so much winter growth, a practice which may result in a thin plant owing to damage by rooks and killing of the tiny plants by frost, etc.; (2) To harrow and roll the crop in spring in order to ensure a firm roothold. With such "winter-proud" crops, however, especially in rainy springs, growth is often so far advanced, and the stems are so tall before rolling can be accomplished, that this act may flatten down and permanently bend the stems, in which case the latter are made weaker than before. (3) One other modification of practice is possible, namely, to feed off the crop with sheep in the spring, a practice which is "as old

as the hills," but not so commonly used as in former times. The following account describes the conditions under which this practice has been successfully adopted by my father, Mr. Alfred Amos, at Wye, Kent, and the good results obtained during the past season:—

Conditions of Soil, etc.—The land npon which the farm is situated consists of a brown loam over 6 ft. of brick earth; the texture would generally be described as friable, though sticky when wet and very retentive of water if recently moved, so that the folding of roots during winter is generally attended with disaster both to the sheep, which become rheumatic, and to the texture of the soil. When properly cultivated, however, and especially because of its high content of organic matter, the soil is friable. All the farm has been under-drained during the last 30 years, so that surplus water can be quickly evacuated from the soil. Within the last 20 years all the land under discussion has been cropped with hops. In normal practice the hop crop receives each year a coat of farmyard manure or its equivalent in some other organic manure, in addition to other artificials, so that the amount of accumulated fertility in the land, after the hops are grubbed up, is very great. Since the grubbing of the hops, and especially during the War, the land has been largely used for potatoes and other market-garden crops; these have also received ample manure, so that the fertility of the soil has not been allowed to fall much below its previous state of fertility. Three fields on the farm were sown with wheat during the past season. The first field was hops in 1914, and has since produced 10 tons of potatoes in 1915, 64 bush. of wheat in 1916, and two heavy cuts of clover hay and a third cut for silage in 1917. The second field was cropped with cabbages in 1917; these were cut for the London market during the spring and summer and the residue folded in autumn to fatting-sheep, which received in addition some linseed cake and weathered peas. The third field carried a heavy crop of beetroot, which was well manured; the beetroot was dug in October.

Tillage.—As soon as possible after the crops were removed the fields were ploughed with the Kent type of plough to a depth of about 8 in. This is considerably deeper than would be considered correct by most wheat growers, because deep ploughing makes it difficult to consolidate the furrow on the subsoil and the wheat is therefore liable to become "root-fallen." The Kent plough, however, is capable of accomplishing very

perfect work and is designed to turn the furrow almost completely upside down, at the same time breaking off the upper edges so that the turned furrow resembles a hare's back. Immediately following the plough a narrow-wheeled cart was drawn by a horse walking in the open furrow, in such a way that one wheel followed in the crease between the second and third furrows; this wheel causes the far side of the second furrow, which is left somewhat loose by the plough, to be pressed tightly upon the subsoil, and thus prevents the wheat becoming "root-fallen." The effect of this pressure by the cartwheel is exactly the same, and, indeed, more efficient than the furrow press which is used largely in Hampshire and neighbouring counties.

In the writer's view, this depth of ploughing (8 in.) is not essential to the practice, provided the land is deeply ploughed for occasional root crops, in which case the soil below the recently-ploughed furrow will allow easy penetration for the wheat roots. Nevertheless, such deep ploughing does ensure a deep range for the wheat roots.

The wheat seed is broadcasted over the land in the afternoon of each day after the ploughing and "cart-wheeling."

With this method, in the event of rain, the surface does not become wet and sticky before sowing. The greater part of the seed falls into the wheel tracks, where it is covered in by harrowing twice in the direction of the furrow. If the soil is sufficiently dry after the whole field is sown, it is cross-harrowed to help break the furrow and to cover the seed more completely. The wheat is planted as early in October as the other work of the farm will allow, because, not only is less seed required, bnt the land is generally drier and more friable, and the plant gets well established before the advent of winter frosts. If the seeding is carried out in October, 7 pecks of seed per acre are sufficient, but 8 to 10 pecks are commonly sown if seeding is delayed till November or December.

Sheep-folding in Spring.—At the end of March, or early in April, as soon as the ground is dry enough, the wheat, having grown rankly and produced a thick foliage, is fed bare by sheep.

The ground is not close folded, since in rainy weather the sheep would tread the wet ground and spoil the texture, but the sheep are given the run of a large piece which they feed down in a week or ten days, and thus in the event of wet weather, having a wide run, they do not seriously damage the texture, though of course they must be temporarily taken off the field if the land becomes very muddy. When the wheat is fed off in this way the sheep at first consume the foliage irregularly, and it is a matter of great importance to keep the sheep on the wheat until the field is uniformly bare; this ensures that as soon as the sheep are removed the crop will shoot again regularly over the whole field.

Feeding with sheep may be continued until the end of April, but it is not advisable to continue later.

Benefits of Folding.—The benefits derived from this folding are numerous:

(1) The treading of the sheep presses and consolidates the ground, as no roller is able to do, for it gives just as much pressure in the hollows

as upon the ridges in the field and so obliterates loose spaces in the seed bed. (2) The sheep in grazing remove all the rank and often somewhat rusty foliage which would develop into long, weak stems. (3) The plant, having perforce to shoot again so late in the season, has not sufficient length of time to develop a very long straw, but, on the contrary, develops a dense crop of short, vigorous and healthy stems, which eventually carry full ears, while growth proceeds without a check and the ears ripen full of grain.

If the surface of the land is uneven after the folding, and for the sake of aerating the soil, the field may be rolled and harrowed.

It should be distinctly understood, however, that sheep folding is not desirable on any crop of wheat which will stand without folding and that the folding of such a crop will inevitably reduce the crop.

Variety.—It is important to select a variety of wheat for this purpose which possesses certain desirable qualities. The variety actually used by Mr. Amos was Yeoman, one of Professor Biffen's new varieties resulting from a cross between Browick and Fife. This variety is one which branches or tillers well and so produces a great number of stems and ears It produces a short, stiff straw which stands well ; this is very important, for even after the folding on such rich land the straw grows fast and tall so that a weak-strawed variety is likely to be laid. Any other variety which possesses these two characteristics, and is in other respects a good wheat, is likely to give satisfactory results.

Manuring.—No artificial manure was given to the wheat crops, but the sheep, fattening on the cabbage, were fed with cake and peas, and dropped their dung on the land. The residues from the manures applied to previous crops were otherwise more than sufficient for the needs of the wheat.

Results.—The following table gives the threshing results of the three fields of wheat harvested in 1918 :—

Field No.	*Previous Crop.*	*Date of Seeding.*	*Date of Folding.*	*Area.*			*Total Crop.*	*Crop per Acre*
				A.	r.	p.	bush.	bush
I.	Clover	1st Nov.	Until 24th April ..	15	2	22	1128	72
II.	Cabbage	1st Dec.	Until 17th April ..	7	3	39	604	76
III.	Beetroot	20th Nov.	Not folded ..	3	2	8	340	96

The area in each case represents the cropped area and does not include boundary fences or roads. The total crop per acre includes " tail " corn, which in each case was rather high amounting to about one-eighth of the whole. The wheat was weighed off at 63 lb. to the bush.

The appearance of all the fields at harvest was extremely fine. Field No. I. after clover, which grew very rankly in

FIG. 1 —Crop of wheat on Mr. Alfred Amos' Farm.

FIG. 2.—The crop of wheat referred to in Fig. 1, cut and in sheaf.

early spring, was folded bare and the sheep taken off on 24th April; this field stood perfectly all over and produced a crop of 72 bush. per acre.

Field No. II. also grew very rankly and was folded bare on 17th April; this field did not stand so well as field No. I., but was somewhat laid in places; it produced a crop of 76 bush. per acre.

Field No. III. after beetroot was sown on 20th November, and did not grow so rankly as the two previous crops; this was natural, since the beetroot crop would have taken all available plant food from the soil up till the end of October, when it was dug. It was not, therefore, necessary to fold this wheat in the spring; the crop grew well and evenly through the summer, stood perfectly at harvest, and produced the amazing crop of 96 bush. per acre. In order that no error in measurement could arise, the field was twice measured with the chain; it was rectangular in shape and measured 1,030 links on the north and south sides and 365 links on the east and west sides.

The crop results of these fields provide striking testimony for Yeoman, and, since the wheat greatly surpasses all other English wheats in " strength " of flour, it should have a great future.

Methods to Replace Folding.—It is interesting to consider whether any other method can be devised to take the place of sheep-folding, where sheep are not available. A few years ago the writer tried the effect of cutting over a crop of wheat with a mowing machine at the end of April, but the result was not successful, the cut foliage dropped upon and partially smothered the wheat plants, and the stems did not seem to be cut sufficiently near the ground; moreover, at harvest, the wheat cut in this way did not stand better than the control plot.

My colleague, Mr. Mackenzie, carried out a small experiment on the University Farm at Cambridge this season, upon the value of cutting over a rank growth of wheat with the scythe, and I have his permission to record the result. The wheat in question was growing on the site of an old hay stack, the foliage was very rank and would certainly have become laid very early in the season. On 12th May the stems were between 2½ ft. and 3 ft. high, when they were cut with the scythe and carted to feed cows; the wheat plants immediately shot again and produced a good standing crop, which ripened about a week later than the rest of the field.

One other question arises in connection with these results. Is it possible to produce similar crops of wheat with nitrogenous and other artificial manures alone, or is the high state of fertility of the soil due to the heavy organic manuring over long periods an essential factor for success? Experiment alone can decide this point.

POTATO SPRAYING TRIALS IN THE CAMBRIDGESHIRE FENS, 1918.

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AT present there are no recorded experiments on horse-drawn spraying of potatoes in the Fens to guide farmers as to the possible value of this method of spraying.

In 1897 experiments were carried out by the School of Agriculture with knapsack-sprayers on some small plots at Benwick and Littleport. The spraying mixture used was a Bordeaux mixture (10 lb. copper sulphate, 10 lb. lime, 100 gal. of water) and this was applied at the rate of about 100 gal. per acre.

The results were as follows :—

Benwick—	
Date of spraying	Third week in July.
	Tons. Cwt.
Average yield per acre of three sprayed plots	8 3¾
Average yield per acre of three unsprayed plots	8 3½
Gain due to spraying	0 ¼
Littleport—	Saleable Tubers.
Date of spraying	Third week in July.
	Tons. Cwt.
Average yield per acre of two sprayed plots	7 12
Average yield per acre of two unsprayed plots	6 4
Gain due to spraying	1 8 per acre.
Percentage sound saleable tubers on sprayed plots	63
Percentage sound saleable tubers on unsprayed	56

In 1898 similar experiments were again carried out at *Benwick.* The plots were sprayed with Bordeaux mixture about the middle of July. There was not much blight, but

the average increase due to spraying on 13 plots was at the rate of 1 ton 9¾ cwt. per acre. On the sprayed plots no diseased tubers were found, whereas on the unsprayed there were several in each sack.

Recent Trials with Horse-drawn Sprayers. — During the past season trials were made on a large scale to determine the value of spraying with horse-drawn machines in the Fens. The experiments were carried out on two fields lent by Mr. F. Hiam, Putney Hill Farm, Prickwillow, and the expenses were borne by the Food Production Department of the Board of Agriculture.

The Spraying.—*The mixtures used were as follows* :—

(1) *Two per cent. Burgundy Mixture.*—This was made in 40-gal. tubs. In one tub 8 lb. of copper sulphate were dissolved in nearly 20 gal. of water ; in another tub 10 lb. of washing soda were dissolved in a similar quantity of water. The washing soda was then poured into the copper sulphate solution and the mixture well stirred. Water was then added to fill the tub, and the mixture again stirred.

(2) *Two per cent. Bordeaux Mixture.*—This was also made in 40-gal. tubs. In one tub 8 lb. of copper sulphate were dissolved in about 20 gal. of water ; *4 lb. of lump quicklime were slaked in a bucket (Buxton lime was used). The slaked lime was made into a cream and then into a milky solution by the addition of water, and finally poured through a sieve covered with coarse muslin into about 15 gal. of water. This lime solution was then poured into the copper sulphate solution, and the mixture well stirred. Water was then added to make up the 40 gal.

Dyke water, which was fairly soft, was used for making these mixtures.

(3) *Bordeaux Powder* was bought ready made.

The wet-spraying machine had a barrel of 100 gal. capacity. In the Fens, where many of the fields are over 20 chains long, a barrel of at least 80 gal. capacity is necessary as this quantity is only just sufficient to go up the field and back. The machine sprayed 5 rows at one time and carried the usual 3 nozzles for each row. About 100 gal. of the spraying mixture were applied per acre.

The Bordeaux powder was applied by means of a "Herrod's Dry Sprayer" at the rate of about 30 lb. per acre.

At the time of spraying the haulm of the potatoes was very high and was pressed down by the horse and machine, and

* For the first spraying this quantity was sufficient, but at the second spraying rather more than 4 lb. were necessary in order to combine with all the free copper.

it was thought that the damage might possibly negative to a large extent the good likely to accrue from the spraying. In a few days however, it was impossible to see where the machine had been as the tops recovered their upright position. In spite of the heavy rains which followed the first sprayings the wet spray stayed on the leaves very well, but much of the "powder spray" was washed off.

Harvesting.—The potatoes were dug by a spinner and picked up by women. At the first picking only "ware" was picked up. A light harrow then followed and potatoes were again picked up. A few were picked out and put with the "ware" and the remainder put into separate bags as "mids." The "ware" and "mids" were then weighed separately.

An allowance of 6 cwt. per acre was made for the final "harrowings." The "mids" consisted partly of "ware," "seed" size, some small potatoes, and some "blights." The ware was marketed and the "mids" used for feeding pigs.

Field 1.—The history of this field is as follows :—

1915	Potatoes	10 cwt. superphosphate.
1916	"	10 " "
1917	Italian Rye-grass ..	No manure.
1918	Potatoes	20 loads farmyard manure. 10 cwt. superphosphate.

The potatoes grown consisted of the varieties King Edward and The Ally :—

King Edward.—Each plot consisted of 9 rows, 28 in. apart and 24·4 chains in length and was, therefore, just over ¾ of an acre in area.

Plot 1.—Unsprayed.

Plot 2.—Sprayed twice with Burgundy mixture, 2 per cent., on 15th July and 6th August, at the rate of about 100 gal. per acre.

Plot 3.—Sprayed twice with Bordeaux mixture, 2 per cent., as Plot 2.

Plot 4.—Sprayed twice. The first time powder sprayed with Bordeaux powder at 5.35 a.m., 11th July (heavy dew), at the rate of about 30 lb. per acre. The second time with Burgundy mixture, 2 per cent., on 15th July, at the rate of about 100 gal. per acre.

Plot 5.—Powder sprayed once at 6.57 a.m. on 7th August (light dew) with Bordeaux powder, at the rate of about 30 lb. per acre.

Plot 6.—Sprayed once on 15th July with Bordeaux mixture, 2 per cent., at the rate of about 100 gal. per acre.

Plot 7.—Powder sprayed once at 6 a.m. on 11th July (heavy dew)

The yields per acre are shown below :—

Plot.	Number of Sprayings.	How Sprayed.	Yield per Acre. Ware.	Mids.*	Total.	Lb. of "Blights" per cwt. of Mids.
			T. Cwt.	T. Cwt.	T. Cwt.	
1	—	——	11 12¼	0 19½	12 11¾	18
2	2	Burgundy mixture, 2 per cent., 15th July and 6th Aug.	13 18½	1 3½	15 2	11
3	2	Bordeaux mixture, 2 per cent., 15th July and 6th Aug.	13 18½	1 4	15 2½	12
4	2	Bordeaux powder, 11th July, Burgundy mixture, 2 per cent. 15th July	13 16	1 2¾	14 18¾	12
5	1	Bordeaux powder, 7th Aug.	10 16½	0 18	11 14½	15
6	1	Bordeaux mixture, 2 per cent., 15th July	12 18	1 5¼	14 3¼	17
7	1	Bordeaux powder, 11th July ..	12 7½	1 0¾	13 8¼	14

* An addition of 6 cwt. per acre has been made for final harrowings.

Blight was first found on 2nd August on Plots 1, 5 and 7. On 6th August it was present on every plot. (The second spraying was, therefore, given just after the blight appeared.) On 19th August, three-quarters of the tops on Plot 1 were dead; half the tops on Plot 5 and about one-third of the tops on Plot 7 were dead.

The other plots were only suffering slightly from blight. On 28th August nearly all the tops on Plot 1 were dead, 80 per cent. on Plot 5, and half the tops on Plot 7. On the other plots only about 10 per cent. of the tops were dead. On 18th September, Plots 4 and 6 showed about 20 per cent. of green in the tops and Plots 2 and 3 about 30 per cent. These plots carried a few green leaves until the end of September.

The state of the haulm is a good guide as to the value of a "spray," and it was obvious before lifting that the largest increase in yield was on the "wet-sprayed" plots. From the state of the haulm it was expected that Plot 5 would give a slightly higher yield than Plot 1. The apparent reduction in yield was not due to the spraying.

The Ally.—The plots of this variety consisted of 9 rows, 28 in. apart and 15·4 chains in length, *i.e.*, about half an acre. Unfortunately, in the first 6 rows of Plot 1 some King Edwards were planted, so that only 3 rows were weighed in this plot.

Plot 1.—Powder sprayed 6.20 a.m., 11th July (heavy dew), and 7.17 a.m., 7th August (light dew) with Bordeaux powder about 30 lb. per acre.

Plot 2.—Powder sprayed 6.40 a.m., 11th July (heavy dew), with Bordeaux powder, about 30 lb. per acre.

Plot 3.—Unsprayed.

The yields per acre were as follows :—

Plot.	*Ware.*		*Mids.**		*Total.*	
	T.	Cwt.	T.	Cwt.	T.	Cwt.
1	10	16	1	10	12	6
2	10	12	1	8½	12	0½
3	9	18	1	8	11	6

The percentage of blighted tubers was about the same as in the King Edwards. Blight was found on all three plots on 2nd August, and spread more rapidly than in the King Edwards. Three-quarter of the tops of Plot 3 were killed by 14th August, about ½ of Plot 2, and about ¼ of Plot 1. The tops of Plot 3 were nearly all dead on 19th August, and those of Plots 1 and 2 by the end of the first week in September.

Plot 1 always looked rather better than Plot 2.

Field 2.—The history of this field is as follows :—

1913	Celery	20 loads of farmyard manure, plus 5 cwt. superphosphate.
1914	Potatoes	8 cwt. superphosphate.
1915	,, ...	10 ,, ,,
1916	Onions	3 ,, ,,
1917	,, ...	3 ,, ,,
1918	Potatoes	10 ,, ,,

Evergood.—Each plot consisted of 9 rows, 28 in. apart and 22·8 chains long and was, therefore, rather less than ⅜ of an acre in area.

Plot 1.—Unsprayed.

Plot 2.—Sprayed twice with Burgundy mixture, 2 per cent., on 15th July and 6th August, at the rate of about 100 gal. per acre.

Plot 3.—Bordeaux mixture, 2 per cent., as Plot 2.

Plot 4.—Powder sprayed once at 4.15 a.m. on 11th July (heavy dew), with Bordeaux powder, at the rate of about 30 lb. per acre.

Plot 5.—Sprayed once with Burgundy mixture, 2 per cent., on 15th July, at the rate of about 100 gal. per acre.

Plot 6.—Sprayed once with Bordeaux mixture, 2 per cent., as Plot 5.

Plot 7.—Powder sprayed twice at 4.45 a.m. on 11th July (heavy dew), and at 6.25 a.m. on 7th August (light dew), with Bordeaux powder, at the rate of about 30 lb. per acre.

Plot 8.—Powder sprayed twice at 6.20 p.m. (no dew), 15th July, and at 5.45 p.m., 6th August (no dew), with Bordeaux powder, at the rate of about 30 lb. per acre.

Plot 9.—Unsprayed.

The yields per acre are shown below :—

Plot.	Number of Sprayings.	How Sprayed.	Yield per Acre. Ware.	Mids.*	Total.
			T. Cwt.	T. Cwt.	T. Cwt.
1	—	——	15 18¾	1 7½	17 6¼
2	2	Burgundy mixture, 2 per cent., 15th July and 6th Aug. ..	Carted by mistake before weighing.		
3	2	Bordeaux mixture, 2 per cent., 15th July and 6th Aug. ..	18 6½	1 9½	19 16
4	1	Bordeaux powder, 11th July (dew)	15 12	1 6	16 18
5	1	Burgundy mixture, 2 per cent., 15th July	16 7	1 8	17 15
6	1	Bordeaux mixture, 2 per cent., 15th July	17 3½	1 4½	18 8
7	2	Bordeaux powder, 11th July (dew) and 7th Aug. (dew) ..	16 4¼	1 10	17 14¼
8	2	Bordeaux powder, 15th July (no dew) and 6th Aug. (no dew)	16 0	1 5¼	17 5¼
9	—	——	15 10	1 6	16 16¾

* An addition of 6 cwt. per acre has been made for final harrowings.

Very few of the tubers were badly blighted. About 3 to 6 lb. of blights were found per cwt. of "mids" and a few blighted tubers were put in with the ware.

At the time of the second spraying the tops were so intergrown that it was difficult to keep the machine in the rows.

Blight was first noticed on 2nd August on Plots 1, 4 and 9, and on 6th August was found on all plots. On 19th August nearly half the tops on Plots 1 and 9 were killed, about a quarter of the tops on Plots 4 and 8, 15 per cent. on Plots 5 and 7, 7 per cent. on Plot 6, and 5 per cent. on Plots 2 and 3. The tops of Plots 1 and 9 were killed off early in September, whereas Plots 2 and 3 did not die off until nearly the end of the month. The order of yield as estimated from the haulm was as follows :—Plots 3—2—6—5—7—4 and 8—1—9.

Cost of Spraying.—The cost of spraying 1 acre of potatoes once with 2 per cent. Bordeaux mixture is as follows :—

	s.	d.
20 lb. copper sulphate	11	0
10 lb. lime	0	3
3 men and one horse do an average of about 5 acres per day	5	0
Wear and tear of machine, etc.	1	6
per acre	17	9

Before the War the cost was about half the above. Where water has to be carted long distances the cost may be considerably higher.

An examination of the foliage after spraying showed that many of the leaves were not covered by the spraying mixture. Most of the machines on the market at the present time apply only about 100 gal. per acre and are not very suitable for covering the large haulms, which are usually found on black Fen land. In order to cover large tops it is necessary to apply at least 200 gal. per acre and it seems probable that the present machines could be improved by being provided with larger pumps and by the addition of an extra pair of nozzles per row about 10 in. above the present pair of nozzles. It is hoped to try this type of machine next season.

The chief faults of those Fen growers who spray their potatoes seem to be :—

(1) Spraying too early. Some of the fen growers make two applications before the middle of July.

(2) The use of spraying mixtures not so effective as home-made Bordeaux or Burgundy mixture.

(3) The use of dry or powder sprays. This is in favour with many growers because it is economical of labour, enables large areas to be sprayed quickly, and water is not always handy for wet spraying. Dry spraying has practically been given up in Ireland in favour of wet spraying, and in the above experiments dry spraying was not nearly so profitable as wet spraying.

Some Fen growers object to spraying on the ground that a large percentage of the crop becomes blighted. This was not so in the above experiments, but in cases where the unsprayed crop is killed off quickly and the sprayed crop killed slowly by blight it is possible that a larger percentage of "blights" would be found in the sprayed crop, but even in this case the extra yield might make the spraying a profitable investment.

The value of spraying cannot be decided from the results of one particular season, but from those of a succession of seasons.

POTATO GROWING ON WASTE LAND IN DORSET.

IN the autumn of 1917 an arrangement was made to break up and utilise for potato growing some 8 acres of waste land on Mr. R. S. Hunt's farm, situated on the Bridport Road, near Dorchester. The land in question was covered with gorse and rough undergrowth to such an extent as to render it unsuitable for use for grazing purposes.

The experiment was put into the charge of Captain Barton, who secured German prisoner labour, and commenced operations by cutting and burning the gorse. The turf was then stripped off and buried, and the ashes from the burnt gorse were spread over the land, thus adding a useful amount of potash. The whole work of clearing and bastard trenching was carried out by hand, and no mechanical labour of any kind was used.

The soil was light loam on chalk, and although no natural or artificial manure was added, with the exception of the ashes from the burnt gorse, an excellent crop of potatoes was lifted. There is no doubt that this was largely due to the bastard trenching. Irish seed, chiefly Up-to-Date, with some British Queen and Arran Chief, was planted. It was, however, of inferior quality, and was affected with superficial mechanical scab. As there was considerable delay in obtaining delivery of the seed, there was no time to sprout it, and the sets were therefore planted direct from the sacks on 4th May, the planting distance being 30 in. between the rows and 15 in. between the sets. The work was carried out by hand, drills being drawn out by a mattock. The sets were only planted 2 to 3 in. deep, and were subjected to very dry weather directly after planting; if they had been planted from 4 to 5 in. deep, the crop would doubtless have been heavier. Hoeing was carried out once, and the young plants were then earthed up.

Spraying operations were started on 26th June, and the whole area was sprayed twice, the ground being covered at the rate of about $\frac{3}{4}$-acre per day. On one or two patches the second spraying was not started until after the disease had appeared on the new foliage, and though in these instances the spread of the disease was arrested, the final results were not as good as those from the areas that had been sprayed in good time.

Captain Barton exercised considerable ingenuity in having an old Army whitewashing machine converted by the camp

The

machine was somewhat heavy and cumbersome, but answered the purpose admirably. A powerful pump, worked by a hand lever, was used, and applied the fluid in the form of a very fine mist. It was only found necessary to spray the undersides of the leaves, as a sufficient quantity of the mixture "fell back" to coat the upper surfaces. A certain amount of damage was caused to the haulm by the long lengths of hose attached to the machine, and its height above the ground rendered it slightly top-heavy.

The small hand manual, illustrated, is more practical than Captain Barton's machine, and should prove of value to small holders, local councils, and allotment associations, where any considerable acreage of potatoes has to be sprayed. The hose pipes, however, should not exceed 10 to 12 ft. in length, or damage may be caused to the haulm.

Practice has shown that these machines can easily be worked by four women—two to manage the hoses and lances, one to push the machine, and one to mix the chemicals, carry water, and to keep the machine supplied.

When lifted in September the crop averaged 10 to 12 tons to the acre, reflecting the greatest credit on all concerned, and showing what good results can be obtained from derelict land.

Thanks are due to Colonel Bulkeley, the Commandant of the Prisoners of War Camp, Dorchester, for permission to prepare this report, and it is hoped that he will see his way to develop more derelict land in the same efficient manner in the future.

Spraying Experiments.—In addition to the valuable work described above, Captain Barton kindly made arrangements whereby the Food Production Department's sub-organiser for spraying for Dorset was enabled to conduct spraying trials on 1 acre of the reclaimed land. Nine rods were left unsprayed as a control and the remainder was sprayed by means of knapsack machines, a large automatic horse-drawn sprayer and a powder sulphurator.

The experimental ground was situated 442 ft. above sea level, and the position was very open and exposed to winds. Irish Up-to-Dates were used on all the plots, and the sets were planted straight from the sacks on 4th May. The planting distances in all cases were as follows: (*a*) between the rows 30 in.; (*b*) between the sets, 15 in.; and (*c*) depth, 3 in.

The rows ran north and south, and the plants were earthed up once, on 10th June. The weather was fine and dry immediately before spraying, except where a dry powder was used. In this case the weather before the application was very wet.

FIG. 1.—The land as it appeared before operations were commenced.

FIG. 2.—German prisoners at work clearing the land of gorse and undergrowth.

FIG. 3.—Bastard trenching.

Fig. 4.—Spraying with a converted whitewashing machine.

Fig. 5.—A small hand manual machine which was found far more efficient and easier to work than Captain Barton's machine.

Plot 1.—Two sections, each measuring 9 rods, were selected, and section A was left unsprayed as a control. Section B was sprayed with 1 per cent. Burgundy mixture on 1st July, and again on 29th July. Slight signs of disease were noticed on the control plot on 8th August, and by 12th August the blight was general. On Section B only a few leaves had been affected by 26th August.

The crops were lifted on 7th October, and the weights were as follows :—

	Total Weight of Tubers. Per Acre.			*Weight of Healthy Tubers. Per Acre.*				*Weight of Blighted Tubers. Per Acre.*			
	lb.	T.	cwt.	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.
A	1,338 =	10	12	1,074 =	8	10	53	264 =	2	1	59
B	1,362 =	10	16	1,284 =	10	3	91	78 =	0	12	43

Plot 2.—This was a test between 1 per cent. and 2 per cent. Burgundy mixture. Section A on Plot 1 again formed the control. Plot 2 was divided into two sections, each 9 rods in area. Section B was sprayed on 1st July, and again on 29th July, with 2 per cent. Burgundy mixture, and Section C with 1 per cent. Burgundy mixture on the same dates. The blight was general on the control plot on 12th August; on Section B on 29th September, and on Section C on 19th September.

The crops were lifted on 7th October :—

	Total Weight of Tubers. Per Acre.			*Weight of Healthy Tubers. Per Acre.*				*Weight of Blighted Tubers. Per Acre.*			
	lb.	T.	cwt.	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.
A	1,338 =	10	12	1,074 =	8	10	53	264 =	2	1	59
B	1,544 =	12	5	1,511 =	11	19	94	33 =	0	5	27
C	1,362 =	10	16	1,284 =	10	3	91	78 =	0	12	43

Plot 3.—In this case 1 per cent. Burgundy mixture was again used, but only one application was given, and that was on 29th July. Disease was general on the control plot on 12th August, and on Plot 3 on 9th September.

The weights on 7th October when the crops were lifted, were as follows :—

	Total Weight of Tubers. Per Acre.			*Weight of Healthy Tubers. Per Acre.*				*Weight of Blighted Tubers. Per Acre.*			
	lb.	T.	cwt.	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.
A ..	1,338 =	10	12	1,074 =	8	10	53	264 =	2	1	59
Plot 3	1,635 =	12	19	1,545 =	12	5	27	90 =	0	14	32

As disease started late this year,, very little difference could be noticed between Section B on Plot 3, and Section B on Plot 1, which was sprayed on 1st July as well.

Plot 4.—Nine rods were sprayed on 1st July, and again on 28th July with 1 per cent. Burgundy mixture. On this plot

the soil was more productive, and the haulm therefore stronger; this probably accounts for the increased weight both of healthy and diseased tubers.

The Control Section A was generally affected by blight by 12th August, whilst Plot 4 was not so affected until 9th September.

The crops were lifted on 7th October :—

	Total Weight of Tubers. Per Acre.		Weight of Healthy Tubers. Per Acre.		Weight of Diseased Tubers. Per Acre.
	lb.	T. cwt.	lb.	T. cwt. lb.	lb.	T. cwt. lb.
A ..	1,338 =	10 12 ..	1,074 =	8 10 53 ..	264 =	2 1 59
Plot 4	1,459 =	11 11 ..	1,354 =	10 14 103 ..	105 =	0 16 75

Plots 5 *and* 6.—The object of this trial was to test as far as possible the relative merits of horse-drawn machines and knapsack sprayers. The area was too small to be a fair trial of horse-spraying, and for various reasons it was found impossible to complete the trial with any amount of accuracy.

Plot 7.—Left unsprayed.

Plots 8 *and* 9.—This trial was of especial interest as a new proprietary article was being tested. This powder was found to be readily soluble in cold water, and the precipitate remained colloidal for several hours after mixing. Three sections of 4½ rods each were chosen and Section A was left unsprayed to act as the control; Section B was sprayed with a wash made from the proprietary powder on 3rd July, and again on 29th July; and Section C was sprayed with 1 per cent. Burgundy mixture on the same dates.

The blight was general on the control section on 12th August, and on Section C on 9th September, while Section B was not generally affected until 17th September.

The crops were lifted on 24th October :—

	Total Weight of Tubers. Per Acre.		Weight of Healthy Tubers. Per Acre.		Weight of Blighted Tubers. Per Acre.
	lb.	T. cwt. lb.	lb.	T. cwt. lb.	lb.	T. cwt. lb.
A	669 =	10 12 42 ..	537 =	8 10 53 ..	132 =	2 1 101
B	819 =	13 0 0 ..	813 =	12 18 11 ..	6 =	0 1 101
C	827 =	13 2 60 ..	771 =	12 4 85 ..	56 =	0 17 87

Mr. Mackenzie, the Department's representative, reported on this trial as follows :—

"This powder made a very good mixture, the precipitate of which remained well in suspension, and did not choke the nozzles of the machine. In spite of heavy rains it adhered well to the foliage, and, owing to its bright blue colour, it was easy to see if the leaves were properly coated. A third spraying would have kept the haulm perfectly immune."

Plots 10 *and* 11.—Two 4½-rod sections were selected and Section B was sprayed on the 4th, and again on 27th July with another proprietary article, which the makers claim may be used for either wet or dry spraying. Section C was sprayed on the same dates with 1 per cent. Burgundy mixture. Blight was general on the Control Section A on 12th August, and on Sections B and C on 9th September.

The crops were lifted on 29th September :—

	Total Weight of Tubers. Per Acre.					*Weight of Healthy Tubers. Per Acre.*				*Weight of Blighted Tubers. Per Acre.*		
	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.
A	669 =	10	12	0 ..	587 =	8	10	53 ..	132 =	2	1	101
B	754 =	11	19	41 ..	747 =	11	17	16 ..	7 =	0	2	25
C	702 =	11	3	96 ..	691 =	10	19	41 ..	11 =	0	3	55

This proprietary article was easy to mix, but the precipitate settled very quickly to the bottom of the machine, and was very apt to cause choking of the nozzles. It was, however, found to be effective in preventing disease.

Plots 12 *and* 13.—Two plots of 4½ rods each were selected ; the powder used on Plots 10 and 11 as a wet spray was applied as a dry powder on Section B on 15th July, and again on 3rd August. Section C was sprayed with 1 per cent. Burgundy mixture on the same dates. Section B was still green at the time of lifting.

	Total Weight of Tubers. Per Acre.					*Weight of Healthy Tubers. Per Acre.*				*Weight of Blighted Tubers. Per Acre.*		
	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.	lb.	T.	cwt.	lb.
A	669 =	10	12	42 ..	537 =	8	10	53 ..	132 =	2	1	101
B	998 =	15	16	93 ..	993 =	15	15	27 ..	5 =	0	1	66
C	1,012 =	16	1	30 ..	991 =	15	14	67 ..	21 =	0	6	75

The results of this trial were satisfactory, but the ground was of a heavier nature on Sections B and C, and this probably accounted largely for the general increase in yield. Dry powders need to be applied when the leaves are moist with dew. The results of trials both in this country and in Ireland have shown the general superiority of wet sprays, but there are many allotments and farms where dry spraying could be adopted with advantage owing to the difficulty in obtaining a supply of water.

Plot 14.—Two sections of 9 rods each were selected. Section A on Plot 1 formed the control. Sections B and C were sprayed twice and thrice, respectively, with 1 per cent. Burgundy mixture ; B on 2nd July, and 31st July ; and C on 2nd July, 31st July, and 20th August.

The control was generally affected by blight on 12th August, Section B on 9th September, but Section C remained green until the crop was lifted on 24th September :—

	Total Weight of Tubers.			Weight of Healthy Tubers.				Weight of Blighted Tubers.		
		Per Acre.			Per Acre.				Per Acre.	
	lb.	T.	cwt.	lb.	T.	cwt.	lb.	lb.	T.	cwt. lb.
A	1,338 =	10	12 ..	1,074 =	8	10	53 ..	264 =	2 · 1	59
B	1,459 =	11	12 ..	1,354 =	10	14	103 ..	105 =	0 16	75
C	1,783 =	14	3 ..	1,775 =	14	1	83 ..	8 =	0 1	30

This trial showed very conclusively the benefits to be derived from a late third spraying.

REPORT OF THE DEVELOPMENT COMMISSIONERS FOR THE YEAR ENDED 31st MARCH, 1918.

THE Report of the Development Commissioners for the year ended 31st March, 1918, has just been issued. Copies may be obtained from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, price 3*d.* net. It is stated that except so far as the special circumstances of the War have called for extended expenditure or new schemes in respect of food supply and natural products, or for the preliminary outlay in the preparation of schemes which may employ labour after the War, the Commissioners have continued the policy which they have adopted since the commencement of the War of confining their advances in the main to ensure the continuity of schemes which were already in working in 1914, and which cannot properly be discontinued. In one instance, that of flax growing, the expansion owing to War needs has led to an increase of the undertaking to a scale on which it is no longer of an experimental or educational nature, such as is appropriate for assistance from the Development Fund, and the undertaking has accordingly been taken over by the Board of Agriculture.

Extra expenditure on a largely increased supply of plants for afforestation has been continued. An advance of £6,905 to the Commissioners of Woods for this purpose has been recommended; while in Scotland, in addition to ordinary expenditure, grants of £2,000 for each of the financial years, 1917–18 and 1918–19, were recommended to meet expenditure on the establishment of forest nurseries, and £930 for an additional Forest Officer on the staff of the Board of Agriculture. A sum of £1,000 was also made available for preliminary arrangements for the afforestation of privately owned lands and a flying survey.

Agricultural Research and Education, etc.—(i.) *General.* —The Commissioners explain in th[illegible] they have adopted for financing [illegible] of

agricultural research at universities, colleges, etc., and the extension of advisory and local investigation work. The scheme includes provision for the encouragement of individual workers in agricultural science outside the field covered by the Research Institutes, and the Commissioners have annually recommended a grant not exceeding £3,000 for this kind of work in England and Wales, and small grants for work in Scotland. The Commissioners originally contemplated a maximum grant of £5,000 for the whole United Kingdom, to be allocated on the advice of a Committee representing Scotland and Ireland, as well as England and Wales, and suggested that the English Board's Advisory Committee on agricultural science might be enlarged for this purpose by the addition of representatives nominated by the Agricultural Departments for Scotland and Ireland. An agreement has now been reached under which the three Agricultural Departments will co-operate for this purpose. The English Board's Advisory Committee has been dissolved and the Commissioners have set up a Committee of their own, including representatives of the three Departments, to report to them on applications for "Special Research" grants, and on such other subjects as the Commissioners may refer to them. The Commissioners are prepared to consider, and, if they are satisfied with the applications supported by the new Committee, to recommend an annual grant, not exceeding £5,000, for the assistance of special research schemes in the United Kingdom.

(ii.) *England and Wales.*—The following grants to the Board of Agriculture and Fisheries have been recommended for the continuance during the financial year 1918–19 of the research scheme, and of the scheme for the development of agricultural education :—

	£
Grants to Colleges and Institutions in aid of—	
(*a*) Scientific research and experiments	*20,500
(*b*) The extension of advisory and local investigation work	8,500
(*c*) Special investigations and research, and scholarships	2,400
Enquiries and experiments, etc., by or on behalf of the Board	1,000
Expenses of administration	950
	33,350
Less amount not payable from the Development Fund	2,150
	£31,200

* For details of the expenditure under this head, *see* this *Journal*, September, 1918, p. 718.

	£
Research in animal pathology to be undertaken at the Board's Veterinary Laboratory, 1918-19	2,000
Research Institute in Plant Pathology at Kew—	
Salaries, wages, and maintenance expenses, 1918-19..	1,411

The proposed expenditure in respect of the grants for Research Institutes and Advisory Centres contemplates, as a rule, only the carrying on of existing work; but slightly increased grants as compared with those given last year have been sanctioned for three Institutes to carry out work which experience has shown to be desirable in the conditions brought about by the War.

Grants of £16,350 were sanctioned in aid of Agricultural and Dairy Education during the year 1918–19 to provide for—

	£
(i.) Grants to local authorities and school managers under the Farm Institute Regulations	9,500
(ii.) Grants in aid of a scheme for the encouragement of cheese-making by the establishment of Migratory and Co-operative Cheese Schools	3,000
(iii.) Administrative expenses of advisory councils established in connection with the Farm Institute and Live Stock Schemes of the Board	250
(iv.) Administrative expenses of the Board	3,400
(v.) Grant to the Seale Hayne Agricultural College for the maintenance of the College Farm for the training of women	200
	£16,350

The grant made in aid of Farm Institutes represents a considerable reduction on the amount contemplated before the War for the establishment of such Institutes in England and Wales; but building and extension schemes have been postponed by Local Education Authorities until the end of the War, and the reduced grant is required to meet the commitments under the Farm Institute Regulations.

In their last Report* the Commissioners stated that they had under consideration an application from the Board of Agriculture and Fisheries for a grant of £7,900 to meet additional expenditure on the vegetable drying and fruit preserving experiments which are being carried out in Warwickshire, under the supervision of a Committee appointed by the Board, in order to test the prospect of these industries on a commercial scale. The vegetable drying plant and premises were found to be inadequate for the purpose, and the Board, therefore, submitted provisional proposals for the purchase of a vacant factory at Chipping Campden, and (after the close of the year

to which this report relates) an advance of £11,000 was recommended for the purchase price of the factory, contents, and site, with 3 acres of land, and for removal and other incidental expenses.

A grant of £595 was made to the Imperial College of Science and Technology for the continuation during 1918 of investigations into the effect of electrical discharge on the growth of crops.

The Commissioners received an application for a grant of £100 in aid of the upkeep of the Haslemere Education Museum, but they did not consider that the work of the Museum in its bearing upon the development of agriculture could be held to justify a grant from the Development Fund, and were unable, therefore, to recommend any advance.

Eggs and Poultry.—A grant of £1,700 was recommended for the continuation on a reduced scale of the scheme for augmenting the production of eggs and poultry during the season 1917–18, by the establishment of centres in England and Wales, for the distribution of reliable eggs for hatching, stations for the distribution of day-old chicks, and the provision of incubating stations.*

Electricity for Agricultural Purposes. — The Commissioners received an application from the Chester Corporation for a grant of £200 to meet the expense of collecting data and making investigations into the practicability of utilising the water power of the River Dee, above Chester, to generate electricity to be used for agricultural purposes, and the development of rural industries. The corporation had already inaugurated with success a scheme for converting into electrical energy the low fall water power at the Chester Weir, and, after consultation with the Applied Sciences Committee of the Royal Society, the Commissioners recommended the grant. An application from the Incorporated Municipal Electrical Association for a grant of £500 in aid of the expenses of a special Committee of the Association on the development of electricity in agricultural areas was refused, as the objects of the Committee did not appear to have a sufficiently direct bearing on agriculture.

Cultivation and Preparation of Flax, Hemp, and Tobacco. — (i.) *British Tobacco Growers' Society.*—A grant of £805 was recommended in aid of the work of the Society during the year 1917–18. Experiments by the Society in the cultivation and

preparation for market of tobacco in order to ascertain whethe it can be grown profitably in this country had been financec for the preceding four years from the Development Fund.

The re-handling and growing are centralised at Broomhil (Norfolk), near the colony of growers. The tobacco is nov grown at the cost and risk of the growers, the work of the Societ being confined to collecting, re-handling, and selling th tobacco without cost to the growers, who receive the actua price realised. The growers were anxious that the continuit of the experiments should not be broken, and the Commissioner agreed with the view taken by the Board of Agriculture anc Fisheries that as the experiments had not yet been brough to any definite conclusion, and the trade reported a continuec improvement in the quality of the tobacco produced, it woulc be a misfortune if the position gained in the market wer allowed to lapse. Reductions were made in administrativ expenses, and looking to the small amount of land and labou required to keep the experiments alive, the Commissioner held that the reduced expense of securing the continuity wa justified.

(ii.)—*British Flax and Hemp Growers' Society.*—

(*a*) A supplementary grant of £15,450 (in addition to the sum o £6,275 granted last year) was made for an extension of the Society's work during the year to 30th September, 1917, undertaken partly in order to ensure a future supply of material for the production of aeroplane cloth, and partly in order to increase the growth of linseed as a feeding stuff for stock.

(*b*) In January, 1918, the Commissioners received an application for an advance of £205,700 in aid mainly of a scheme of flax cultivation for war purposes. The sum was made up as follows :—

(i.) £5,700 by way of grant for the year ending 30th September, 1918, to continue the scientific and technical investigations into the growth and treatment of flax, and to meet the organisation and administration expenses of the Society.

(ii.) £200,000 by way of loan for the initiation of an extended programme for the cultivation of flax in Great Britain and its production into fibre.

The growing of flax for fibre on the scale contemplated carried the undertaking outside the experimental or demonstrative sphere appropriate for aid from the Development Fund, and after the application was received arrangements were made for the whole of the flax-growing work of the Society to be

Grants to the Society and to the University of Leeds have been made from the Development Fund for several years past to meet the cost of experiments in the cultivation and preparation of flax. The net total advanced to these bodies from the Fund for flax and linseed schemes up to 30th September, 1917, was £28,293, and included capital expenditure on buildings, machinery and equipment of two experiment stations. The Board of Agriculture and Fisheries took over the control of these schemes as from 1st October, 1917, and it was arranged that the existing property and assets should be transferred to the Board. Under this arrangement the whole of the abovementioned sum of £28,293 has been repaid to the Development Fund from Votes of Credit.

The Commissioners will probably continue to make small grants to the Society for certain scientific and technical experiments, and they recommended a grant of £2,150 for this purpose required during the year ending 30th September, 1918. The greater part of this grant will be covered by receipts which return to the Development Fund.

Encouragement of a Beet Sugar Industry.—In their last Report the Commissioners stated that they had recommended a loan of £125,000 for the purchase of the Kelham Estate in Nottinghamshire with a view to the establishment of the beet sugar industry in this country. The price of the estate was eventually fixed at £130,000, and the Commissioners recommended a further loan of £5,125. Of this sum £5,000 was required for the completion of the purchase price of the estate, and £125 for payment of interest on the amount of the deposit. At the close of the year the Commissioners had under consideration an application for a further loan required for payments to outgoing tenants, and for stocking, equipping and laying out the estate as a large farm, with a view to its preparation for sugar beet as the main crop.

Horse and Live Stock Breeding.—A grant of £37,500 was recommended to meet the cost during the year 1918–19 of the scheme for the improvement of heavy horses, cattle and swine, the extension of milk recording, and the employment of live stock officers at Agricultural Institutions in England and Wales*. The Commissioners have under consideration the whole question of the continuation of grants from the Development Fund in aid of this scheme after the year 1918-19, in the light of experience already gained and of the special circumstances crea

Development of Agricultural Co-operative Credit.—During the year the Commissioners received an application from the Scottish Central Land Bank, Ltd. (a non-dividend earning bank, registered under the Industrial and Provident Societies Acts), for a grant, or a loan at a low rate of interest, of £20,000 to promote the development of agricultural co-operative credit amongst small holders in Scotland. The Bank was established in July, 1914, under the direction of the Scottish Small Holders' Organisation, the greater part of the capital being obtained from one of the Joint Stock Banks in Scotland. The Land Bank accepts security from, and makes loans to, individuals formed into Local Credit Societies. Members individually undertake liability to the Bank on the familiar principle of liability limited by shares, while collectively they are all responsible to the extent of the whole borrowings of their society. The farm stock is the security for loans made, and advances by the Bank are limited to two-thirds of the value of the stock, the remaining third being raised co-operatively among the small holders. The Land Bank has already done some excellent work, but its capital is small, and the rate of interest at which money can be obtained has prevented progress. The Commissioners considered the application and offered to recommend that the Development Fund should guarantee to the Joint Stock Bank the loan repayments by the Land Bank, so far as not met from the assets of the Land Bank; the guarantee to be limited to twice the subscribed share capital of the Land Bank, and not to exceed £20,000. The Commissioners suggested that if such a guarantee were given the rate of interest charged by the Joint Stock Bank should be substantially reduced. At the close of the year negotiations were proceeding.

Organisation of Co-operation among Agriculturists in England and Wales.—Grants to the Agricultural Organisation Society in aid of its work during the year 1917–18 were recommended as follows:—

(*a*) Block grants of £13,000, and

(*b*) An additional sum equal to the amount of the Society's income from subscriptions and affiliation fees for the year. This sum amounted to £2,350.

The Board of Agriculture and Fisheries have also given a contribution of £2,000 from the Small Holdings Account administered by them.

in fact, rather more than double the amount given in the preceding year.

The Society urged that owing to the conditions created by the War there was a great need and opportunity for increased agricultural co-operation, and informed the Commissioners that the Society had been re-organised in order to meet the situation. The Commissioners, however, had some doubt whether the time was opportune for a large extension of the Society's activities, as much of the work which would naturally fall to Co-operative Societies was being done by the County Agricultural Committees, and the fact that farmers were so much occupied with war-time calls might render the present a difficult time for the formation of new Societies. There was also the fact that the operations of the State in the control of production and sales, and arranging for the supply of machinery, seeds, fertilisers, etc., provide for many matters which would normally fall to co-operation. The Commissioners had several conferences with the Board of Agriculture and Fisheries, who expressed the view that, as a matter of policy, largely increased agricultural co-operation was necessary now on national grounds. The Commissioners considered the position as a whole, and finally agreed that a case had been made out for supporting the general lines of the application. They stipulated that an absolute condition of more support from the Affiliated Societies must be insisted upon, and that the Women's Institutes, for which a grant of about £2,000 was asked, must be excluded from the Society's application as not being a form of agricultural co-operation to be assisted upon that application. The grant was sanctioned by the Treasury on the understanding that it was to be considered as of an exceptional nature, and that the whole question of continuance of assistance would be reviewed at the earliest convenient opportunity in the light of the success attending the efforts of the reconstituted management, and that increased support must be obtained from the Affiliated Societies with a view to reducing the assistance required from public funds.

Among other conditions, the following were made by the Commissioners:—

(*a*) That the Society shall be careful not to interfere in any way with the work of the constituted authorities in relation to education or food production.

(*b*) That the Board of Agriculture and Fisheries shall be represented upon the Executive Committee of the Society by two nominees.

Forestry.—(i.) *General.*—During the year under review the Commissioners received the Report of the Forestry Sub-

committee of the Reconstruction Committee. Before this Sub-committee had commenced its work the Development Commissioners had set forth in a Memorandum submitted to the Reconstruction Committee the advantages of leasing and proceeds-sharing as compared with a system of land purchase. The Commissioners have always contemplated that part of the land to be afforested by direct State action must necessarily be acquired by purchase outright; but with a view to reducing as far as possible the inevitably serious expenditure on the creation of commercial forests, after careful enquiries, they proposed these alternative methods. The Commissioners observe with satisfaction that these methods have been approved by the Reconstruction Sub-committee.

In their last Report the Commissioners stated that it was not necessary for them to urge the importance of the afforestation of land at present unproductive. The experience of the War and the extensive felling of forests, both in the United Kingdom and on the Continent, have emphasised the national importance of home-grown supplies of timber. The Commissioners have continued to consider the most appropriate and economic methods of promoting the development of forestry in the United Kingdom, and urge the importance of the immediate preparation of afforestation schemes, so that they may be ready when the War is over. They have recommended grants for survey work, among other purposes, and considerable areas of land have been mapped out as suitable for planting. In their view, the preparation of definite schemes should be taken in hand at once.

The Commissioners have continued to press the adoption in Ireland of their proposals for the afforestation of privately-owned land. The Department of Agriculture addressed enquiries to such Irish landowners as they considered would be likely to adopt the proposals, and as a result various provisional offers of land for the purpose were made.

The Commissioners suggested that the Department should consider the suitability of the areas for schemes of economic forestry, and submit definite proposals in respect of those areas for which the Department is prepared to frame and carry out schemes. The Department is proceeding to give effect to this suggestion, and has informed the Commissioners that about 10,000 acres have been cleared during the last four years on private estates and on the Department's forestry lands and

the War. The Department has 750,000 seedlings in hand. In addition there will be the product of the sowings in the season of 1918.

Representatives of the Commissioners visited Ireland in September, 1917, for the purpose of inspecting land suitable for afforestation and the results of work already being financed from the Development Fund.

A further matter of importance, to which the Commissioners have given attention, is the provision of nursery stock in case there should be a deficiency when the War is over, and planting operations on a large scale will become imperative. The grants recommended for this purpose are mentioned below. At the close of the year the Commissioners had just received and were considering a provisional application for a grant required for the purchase of additional seed for use by the three Agricultural Departments responsible for the carrying out of State forestry schemes in the United Kingdom. For this purpose a recommendation, which fell outside the year now under review, was made for a grant of £4,400.

(ii.) *England and Wales.*—A grant of £5,000 to the Board of Agriculture and Fisheries was recommended for the continuation in the year 1918–19 of the scheme for research, forestry instruction and advisory work at four centres in England and Wales, minor forestry experiments and surveys.

Application was made by the Board for a grant of £1,500 from the Development Fund with a view to the formation of a statistical section in the Board's Forestry Branch to collect and correlate the data afforded by the fellings which are now taking place. The Commissioners were in complete agreement with the Board as to the importance and urgency of securing and analysing the information with a view to afforestation after the War, but it did not appear to them that the constitution of a statistical section at the Board for this purpose was an object properly to be charged upon the Development Fund.

The Commissioners have continued to give attention to the provision of forest-tree seedlings in case there may be a shortage after the War, when replanting on a large scale will be imperative, having regard particularly to the extensive areas of timber which have been felled during the War. Grants to the Board of Agriculture and Fisheries and the Commissioners of Woods for the provision of nursery stock have been made from the Development Fund during the past three years, and it is

close

of the 1917 season. About one-third of the total growing stock is immediately available for the afforestation of some 5,000 or 6,000 acres. An application was received from the Commissioners of Woods for a grant of £6,905 in order to meet expenditure in the year 1917–18. It was arranged to line out all the seedlings, raised both by the Commissioners of Woods and the Board of Agriculture, in nurseries under the control of the Commissioners of Woods, who will in future undertake the whole of the operations in connection with the raising by the State of emergency plants in England and Wales. The grant applied for was recommended.

A grant of £200 was also made to the Commissioners of Woods towards the cost of the maintenance during 1917–18 of the Forest of Dean Demonstration Area, on the condition that the Land Revenues of the Crown continue as hitherto to bear the cost of general improvements and maintenance of Dean Forest and adjoining woodlands.

(iii.) *Scotland.*—The following grants to the Board of Agriculture were recommended :—

(i.) £2,000 for each of the financial years 1917-18 and 1918-19 to meet expenditure on the extension of State Forest Nurseries in Scotland, with a view to the provision of plants for afforestation when the War is over. About 4,500,000 seedlings had been produced by the close of the 1917 season, mainly by means of grants from the Development Fund.

(ii.) £1,000 to meet expenditure in the year 1917-18 in connection with (*a*) preliminary arrangements for leasing or other proposals for the afforestation of privately-owned land in Scotland, and (*b*) survey work.

(iii.) £2,000 for the year 1918-19 to meet the salaries and expenses of three forestry officers for advisory, survey, and research work—one at each of the three Scottish Agricultural Colleges. This grant includes provision for the cost of survey work and the preparation of afforestation schemes.

(iv.) £930 to meet for the period 1st December, 1917, to 31st March, 1919, the salary and expenses of an additional Forestry Officer to the staff of the Board of Agriculture. The Commissioners were informed that the Secretary for Scotland, looking in particular to the felling of Scottish forests during the War, was satisfied that Scotland was ripe for definite afforestation schemes. The Board stated that they were anxious to prepare schemes to be in readiness for planting operations when the War is over, and that the appointment of an additional officer to the Board's staff for this purpose was essential. The Commissioners readily recommended the grant, as they consider that the preparation of afforestation schemes is of urgent national importance.

An application was received from the Board of Agriculture for a grant in aid of the capital cost and maintenance charges

of a proposed School of Forestry in Central Scotland. Th Commissioners were sympathetic with the proposal, but unde existing circumstances were not prepared to recommend th advance. In order that they might be in a position to conside the scheme in definite shape they asked the Board to inforr them when the locality for the school had been provisionall chosen and the Board was in a position to give furthe particulars of the scheme.

(iv.) *Ireland.*—The following grants were recommended :-

(i.) £1,517 for the year 1918-19 to meet the salaries and expense of the Department of Agriculture's central forestry staf whose appointment was made in connection with work finance from the Development Fund.

(ii.) £1,720 for the year 1918-19 to meet the cost of forestry wor in Ireland financed from the Development Fund, and concei trated at the following three areas, viz., Ballyhoura, Count Cork; Slieve Bloom, Queen's County; and Aughrim-Gler dalough, County Wicklow.

(iii.) £109 to meet excess expenditure during 1915-16 on the workir of the Slieve Bloom and Glendalough-Aughrim afforestatio areas.

(iv.) *£100 for the expenses during 1917-18 of a Forestry Inspect from the Department whilst engaged on a joint survey wit officers from the English and Scottish Boards of Agricultur The primary object of the survey party, whose purpose wa to work in selected areas in the United Kingdom, was t standardise methods of survey so far as this could be effect by associating Forestry Officers from the three Departmen of Agriculture in the same survey, and at the same time map out a considerable area of land suitable for afforestatio*

Reclamation and Drainage of Land.—In the previous Repo mention was made of a scheme for the improvement of tl drainage of the Upper Ouse Valley, an advance not exceedir £250 being recommended for an engineer's report. Th advance enabled a report to be made upon the Hundre Foot River; but, a further report upon other portions of tl area being required, the Commissioners, in August 191 recommended an advance not exceeding £500 for the purpos

In September, 1917, the Commissioners recommended a advance, not exceeding £100, to the Land Reclamation Societ to enable a preliminary engineering report to be obtained c the possibility of reclaiming the Otmoor, a basin of some 5,0(acres in extent, lying a few miles north-east of Oxford, whi is constantly in a state of flood. An advance, not exceedi £150, to the Board of Agriculture for Scotland has also be recommended for a similar report as to the proposed

tion of about 30,000 acres of low-lying land along the banks of the River Spey. These schemes promise to provide employment when needed and to make a useful addition to the area of cultivation.

AGRICULTURE AND RECONSTRUCTION:

EXTRACTS FROM PRIME MINISTER'S SPEECHES.

Speech in London on 16th November, 1918.—Agriculture was almost completely neglected by the State. During recent years very, very little was done—more, perhaps, than used to be, but very little. It was just like feeding a hungry giant with a teaspoon. In 1913 £300,000,000 worth of the products of the soil were imported from abroad which could have been produced here—and could have employed 400,000 more hands in the healthiest of occupations. That is one of the problems, and I trust that a good many of the soldiers when they come back will be settled on the soil.

Agriculture.—In England, Wales, Scotland and Ireland you have more of the land cultivated at the end of four years of war than you had in 1913, with less labour—the only country where the agricultural produce has gone up.

Speech on 23rd November, 1918.—What is the next revelation of the great War? The enormous waste of the resources of our land. What do I mean? I mean on the surface and under the surface. Britain is a rich country so far as its soil is concerned. We import hundreds of millions of our supplies from abroad. I do not mean to say that we can grow them all, but we can grow a very much larger proportion of our supplies than we have done in past years. Take food. You can grow vast quantities of food in this country for which you have been dependent on foreign imports, but you want a much more intelligent policy than that. The land must be cultivated to its full capacity. That ought to be an essential feature in the new Britain.

During the last two years we have made special efforts to increase the cultivation of the land because we were not sure what might happen as the result of the submarine campaign, and we had made up our minds that, whatever happened, the submarines were not going to starve us. So we undertook a great agricultural policy. In spite of the reduced labour we increased the area of cultivation in Great Britain and Ireland

combined effort. We brought the landlords in, and the farmers in, and the labourers in, and everybody who was concerned with the cultivation of the land. We got them all to work together for that purpose, and in two years, with reduced labour, we brought back the cultivation of England to where it was 40 or 50 years ago.

If you can do that with reduced labour, what can you do when the men are back on the land, and when you have more time to work out your plans. After all we had to improvise plans. We had to rush them through. They were necessarily crude. There were mistakes here and there, as always will happen when you have to do a thing in a hurry. Now you have more time to work out your plans with more men. But a systematic effort must be made to bring a population back to the land.

I am not sure we fully realise how that will react upon other problems. If you bring a population back to the land it relieves pressure on the labour market, and it sustains the labour market.

. . . . . .

An intelligent agricultural policy is the basis of a great industrial policy, and a systematic effort must be made to bring people back to the land. That is the place to grow strong men. The touch of the soil re-invigorates and re-enforces. When there are any signs of exhaustion bring them back to the mother land, and the old life that is in the veins of Britain flows through them, and you find them re-invigorated and strong. Give back the people, as many as you can, to the cultivation of the soil. But it must be done systematically. It must be done intelligently. We must sweep aside prejudices. The difficulty, believe me, is not with interests, it is with prejudice. And that is equally true in every business. People talk about the vested interests. It is not the vested interests I am afraid of, it is vested prejudices. Sweep these away and the State can easily deal with the interests. You must not take any man's property away. You cannot build a great State on dishonesty. You are bound to come to grief if you attempt it.

. . . . . .

You must see that the land is cultivated properly, and there is a better chance of doing it than there was 40 or 50 years ago. The principles of farming are different. Science is coming into the farming industry like any other industry. The capacity of [illegible] to a much greater extent than it could

40 or 50 years ago. But you must do it on scientific principles. You must have a national supply of fertilisers that the Government ought to take care to make available.

There is another way the Government can help. You must have increased security for all capital that is spent upon the land. No man will spend his capital anywhere, whether it is industry or agriculture, unless he is quite certain he is going to get an adequate return for it and that it will not be confiscated. You must eliminate the incompetent cultivator. You must have scientific production, which involves more complete and thorough training. Training for the cultivation of the land ought to be a very special concern of the Government. You must have reclamation of waste land. That cannot be undertaken by individual landowners, for the simple reason that it may not depend entirely on them. For instance, there is the draining. It is no use your draining one part if you know that the next part is not drained.

Reclamation has got to be a connected effort directed by the State, and at the present moment there are hundreds of thousands of acres that, on investigation, have been demonstrated to be capable of being reclaimed.

. . . .

There must be a scheme for settling the gallant soldiers and sailors on the land. . . . I do not say that all the soldiers will go back to the land. The vast majority will return to their old occupations. But I am told that a good many of them who have been living an open-air life do not want to return to the close atmosphere of the workshop and factory. If that is the case they ought to have the opportunity of living on the land, but they ought to be trained for the purpose. It is no use putting a man who has been used to living in a shop straight away to take charge of a small holding and run it himself. . . . It requires training, like any other industry, and you must provide that training to begin with.

. . . . . .

There is the question of improved transportation, one of the most important questions. . . . It is not merely a question of carrying goods quickly and cheaply—the food and products of the farmer, the small holder, and the allotment holder—to the market. It is a question of carrying to the farmer, to the allot-
...ith a

in such a way that you cannot do by any other means, and I consider, therefore, that to be one of the most important matters.

I should also like to develop the importance of canals.

. . . . . .

You cannot pay the enormous debt which this War has brought upon us unless you increase production.

Speech on 7th December, 1918.—It is two years to this very day when I was summoned by the Sovereign of this country to form an Administration for the purpose of conducting the War . . . . The first thing that we concentrated upon was beating the submarine campaign . . . The food supplies were worked up . . . When we came in, home production was down by hundreds of thousands of acres. We had to take many men away from the fields into the battlefield. In spite of that, this year, compared with 1916, there were four million more acres under cultivation than we had in that year. That is something of which those who organised this agricultural production have a good right to feel pleased and proud.

Agricultural Reconstruction in Wales after the War.

IN view of the interest that is now taken in the general question of Agricultural Reconstruction after the War, it may be useful to draw attention to the views of the Welsh Agricultural Council on the matter as it relates to the Principality, and as expressed by the Council some time ago. Since that date the area under arable cultivation in Wales has been materially increased. The programme put forward by the Welsh Agricultural Council doubtless has an interest for many outside Wales, and for that reason it is considered desirable to publish it in this *Journal* at the present time.

I. The Council are of opinion that the land in Wales, which is mainly under grass, is not, from the point of view of the nation, producing what it should do in the way of food.

The acreages under arable land and permanent grass in Wales (including Monmouth) in 1875 were 1,112,205 and 1,815,527, respectively, while in 1915 the acreages under these heads were 725,683 and 2,251,840, respectively, showing a reduction in the area of arable land since 1875 of 386,522 acres.

II. They are also of opinion that it is possible to increase the production of wheat and other cereals in Wales without decreasing the output of live stock and live

The following extracts from tables of comparison embodied in the Parliamentary Paper (Cd. 8305), 1916, "The Recent Development of German Agriculture," by Mr. (now Sir) T. H. Middleton, C.B.,† are of interest in this connection :—

Cropping of Cultivated Land in England and Wales, and in Germany.

Crop.	England and Wales. Average of 1905-14.*		Germany. 1913.*	
	Thousand Acres.	Per cent.	Thousand Acres.	Per cent.
Permanent grass for pasture	11,138	40·83	2,655	3·23
Cereal crops	5,320	19·50	37,822	45·97
Potatoes	435	1·59	8,586	10·44

* The areas occupied by the various crops in England and Wales in 1913 differed but slightly from the average for the 10-year period.

Production of Meat (including Eggs) and Milk per 100 Acres Cultivated Land in Great Britain in 1908, and in Germany on the average of the Two Years 1912 and 1913.

	Great Britain. 31,900,000 Acres of Cultivated Land.		Germany. 82,274,000 Acres of Cultivated Land.	
	Home Production.	Production per 100 Acres of Cultivated Land.	Home Production.	Production per 100 Acres of Cultivated Land.
	Tons.	Tons.	Tons.	Tons.
Total Meat	1,265,150	3·97	3,513,260	4·27
Milk*	5,555,000	17·4	23,160,000	28·1

* In the case of German manufactured dairy produce, the figures for butter and cheese have been converted into terms of milk.

III. The Council strongly support the reform of the land laws, so as to ensure to the tenant-farmer a fair rent, full compensation for all improvements and security of tenure, so that a tenant may not be disturbed so long as he cultivates his holding in a husband-

IV. In the opinion of the Council the State should guarantee a minimum price for corn in order to make it possible for the farmer to bring and maintain a larger area of land under cultivation.

V. If a minimum price for corn is guaranteed by the State, a minimum wage fixed by Wage Boards should be secured to the farm labourer.

VI. The Council urge that steps should be taken by the State to provide adequate and suitable housing accommodation in rural districts.

The Council consider that it would be impossible to secure adequate provision in this respect unless the Government establish a national housing scheme conceived on broad, comprehensive lines.

VII. Action should be taken by the State with a view to (*a*) the development of Agricultural Education, particularly in the direction of providing facilities for the training of pioneer farmers, organisers and teachers and for research; (*b*) the improvement of rural transport; (*c*) the extension of co-operation,; (*d*) the promotion of measures of reclamation, and (*e*) the adoption of extensive schemes of afforestation.

The Council are of opinion :—

(1) That the ordinary curriculum of the rural Elementary Schools should be adapted to the needs of the districts and that in all such schools Elementary Science with a rural bias should be taught.

(2) That, in view of the probability that compulsory continuation schools will be established in the near future, the curriculum of such schools that may be situated in the rural districts should be so framed as to arouse the pupils' interest in rural life.

(3) That existing district roads should be improved and widened, and that new roads should be constructed to provide routes for road motors to convey traffic between country districts and railway centres, such works and services to be undertaken and maintained by the State.

(4) That the Credit Scheme already established by the Board of Agriculture should be developed so that, in addition to the purchase of seeds and manures, farmers may obtain assistance to procure any other requirements necessary for cultivation purposes, and that, in order to

should be taken to establish schemes for insuring (i.) live stock, and (ii.) against other agricultural risks, on co-operative lines with State guarantees.

(5) That the question of drainage requires immediate attention and that the Government should, on demobilisation, undertake the draining of large tracts of land in Wales which have become useless for agricultural purposes and which, the Council consider, would, if properly drained, become highly productive.

(6) That some permanent body or bodies should be set up in order to secure the proper drainage of lands where the present drainage works have become ineffective.

VIII. The Agricultural Holdings Act, 1908, needs amendment so as (i.) to secure for the outgoing tenant more adequate compensation for unexhausted improvements, (ii.) to simplify the general procedure under the Act, and (iii.) to enable a tenant to carry out any improvement on notice being given to the landowner, and to be entitled to compensation under the Act unless the landowner proves to the satisfaction of the Board of Agriculture, as an independent authority, *that the proposed improvement is unnecessary*, Schedule I., Part I. of the Act being revised accordingly.

IX. In the opinion of the Council, the Live Stock Improvement Scheme should be made a permanent activity of the State and additional funds should be expended by the State in this connection.

The Council are further of opinion that increased financial provision should be made for the purpose of breeding Welsh cobs, a breed of particular importance to Wales.

X. Measures should be taken by the State for the establishment of an increased number of small holdings.

XI. More liberal provision should be made by the State to enable tenants, who so desire, to become owners of their holdings.

XII. The use of agricultural land for the rearing and preservation of game should be prohibited by law.

XIII. In the opinion of the Council, provided (*a*) a minimum price for his corn is secured to the farmer, (*b*) a minimum wage for his labour to the labourer, and (*c*) the relationship between landlord and tenant is placed

on a satisfactory basis, some degree of compulsion should be imposed by the State to secure production from the land.

XIV. Should it be found impracticable to legislate on the lines of the foregoing resolutions for England as well as Wales, special legislation should, in the opinion of the Council, be enacted for Wales in this connection.

NOTE.—Several of the recommendations have since been carried into effect, while the general question of Agricultural Reconstruction in regard to England and Wales has been dealt with in detail by the Agricultural Policy Sub-Committee of the Reconstruction Committee.*

Dung Heaps and the Preservation of Farmyard Manure.†

FARMYARD manure, whether it is to be used in spring or in autumn, should always be carefully kept. At present, owing to a shortage of artificials, the need for this care is all the greater.

Spring Manuring.—In northern districts of high rainfall, spring manuring is the general practice. There, most of the dung is employed on the root shift, the greater part of one season's "make" being applied in the drills in spring. During frosty weather most of the dung is carted to the field where it will be required and heaped in "middens." Sometimes short dung is scattered on to the stubbles in autumn direct, and ploughed in; this is generally the small proportion which has been left over from the previous spring, after the root land has been manured, and, although it is recognised as being less efficient than longer dung applied in spring, its use in autumn reduces the pressure of work in the following spring and is justified on that account. This manure will either have been left in the yards or heaped in the fields somewhere handy for the stubbles.

Autumn Manuring.—In southern districts it is the custom to apply the greater part of the manure in autumn and winter, in preparation for wheat, roots or potatoes. The dung in this case consists mainly of what has been made in the yards in the previous winter; consequently the interval between the making and the application, and, therefore, the opportunities for waste, are greater than in the northern practice. The dung is, if there is room, sometimes left lying in the yards till it is

* See Final Report of this Committee (Cd. 9079, 1918). The Report was reviewed in this *Journal*, July, 1918, p. 385.

† This article is issued as Food Production Leaflet No. 60. See also Leaflet No. 93 (Farmyard Manure).

required after harvest, then carted out and spread on the land and ploughed in at once. On farms where there are covered or partly covered yards this is probably the best plan, provided the manure is prevented from becoming dry. There is no great difficulty in ploughing in such manure.

But to save time in the busy autumn months and to get the dung shorter, the yards are often emptied during frosty weather in late winter or in slack times in summer, and the manure heaped somewhere handy, either in the "seeds" field intended for wheat or potatoes or in readiness for the stubbles. In either case the manure is afterwards spread broadcast and then ploughed in.

Disadvantage of "Short" Dung.—There is no doubt that "short muck" is easier to handle, but it must be remembered that such material is the result of fermentation, and fermentation means loss of plant-food. Much of the bulky material wastes away and is lost; the residue is less able to retain the liquid, and this also tends to disappear.

Care in preventing Loss from Manure.—Whether the northern plan of applying manure in spring or the southern plan of applying it in autumn be followed it is most important that when dung-hills are made in the field or anywhere else there should be as little loss as possible. The art of making a dung-heap seems in great measure to have been lost, and the once common and efficient "cart-over" or "draw"-heap is now seldom seem.

Making a Dung Heap.—*Bottom of Heap.*—If the breadth decided upon is 15 ft., the first cartloads should be dumped in a row across the whole breadth; these loads should not be spread out thinly. The second lot of loads are laid in the next row across the breadth, and so on, the carts always passing over the loads previously laid down until the proposed length is reached. Thus the bottom is built.

Following Layers.—The next layer is formed in the same way, only each load after being dumped is well spread out, and the middle of the heap is kept slightly higher than the ends; the carts thus pass up an incline at one end and down at the other, till the whole is well trodden and compacted by the carts and horses.

Finishing off.—When the dung-hill has reached the required height the thin sloping ends and any loose dung along the sides should be thrown on top and trampled down, and the whole top then brought to a gentle ridge. It should be covered with a layer of earth, about 6 in. thick, and with straw-matched

hurdles if these are available, but it is wasteful merely to cover loose dung; it should first be firm and solid. The object of making the heap firm is to prevent air getting in and causing fermentation. Just as, with a fire, too much air wastes coal, so, with a manure heap, too much air wastes plant-food.

Simple Rules for dealing with Manure:—

1. Until it is wanted for use, leave it where practicable under the beasts, if possible in a well-covered yard.
2. Never throw it out in loose heaps.
3. Move it about as little as possible. If it has to be moved store it once for all in a solid heap as near as possible to the place where it is to be used, and shelter it from rain.
4. After broaching the heap, waste no time in ploughing the dung in. Don't leave manure lying about in small heaps.
5. Try to avoid keeping manure during the summer—it is hotter then, and heat means waste.
6. Keep all the liquid in it; don't let it drain away. If it must drain away, let it drain into a properly constructed liquid manure tank.
7. Remember that the two things that spoil manure most are air and rain, so keep it well protected from both.
8. And remember that every little bit of extra care taken means both an advance in good farming, and what is more important at present, an increase in food for man and beast.
9. Use litter as freely as supplies will allow; it not only makes for the comfort of the animals and produces more manure, but there is evidence to show that it minimises the losses of ammonia.

Notes on Feeding Stuffs for February: *From the Animal Nutrition Institute, Cambridge University.*

IT is a pleasurable duty to be able to record the general easing of the feeding-stuffs situation, and farmers generally will welcome the relief afforded them by the recent relaxations in control announced by the Ministry of Food. Before the War, the stock feeder was accustomed to the lavish use of imported cakes and meals, and a considerable proportion of home-grown barley and inferior wheat was also

devoted to stock-feeding purposes. For the first two years of the War, the stock feeder was able to carry on without much difficulty, but with the declaration of unrestricted U-boat warfare, the feeding-stuffs position became more difficult, and importation of feeding stuffs for cattle practically ceased. The position, already difficult, was accentuated by the necessity of conserving for human use all feeding stuffs capable of manufacture into human food, and towards the latter part of 1918 the outlook for the stock feeder had become very black indeed. Practically, the use of all feeding stuffs was denied to him. Barley, rye, wheat, and even tailings and screenings, were all earmarked for human food, and the only feeding stuffs, of which the grower had free use, were beans, peas, and oats.

Only national necessity justified this action on the part of the Government, and the cessation of hostilities quickly evidenced their desire to ease the situation for the stock feeders as far as emergencies allowed.

Rye has already been withdrawn from control; of *barley* farmers are allowed the use of 20 per cent. of their crop; *dredge corn* may be used for feeding stock; and licences for the use of *tailings and screenings* are more readily obtained. As a result, too, of the alteration of the milling standards, a greatly increased quantity of millers' offals is reaching the market, and the offals are of a much finer quality. It is understood also that the Ministry of Food are increasing, as far as lies within their power, the importation of oilcakes and meals.

A note of warning, however, should be added here. The feeding-stuffs market has been so exhausted during the War, stocks are at such a low ebb, and the shipping situation is still in such an unsettled state, that it will be some little time before supplies of feeding stuffs are ample enough to justify the removal of all control. Until that time arrives, the policy hitherto pursued will be continued, but the arrangements made for the distribution of feeding stuffs after 25th January (when the present buying permits expire) by the Ministry of Food will be considerably simplified. Farmers generally will have already obtained their certificates and registered them with the dealers with whom they dealt in 1917, and all those *who have not already done so* should apply immediately to their Area Livestock Commissioner for a form of application for feeding stuffs for the stock for which supplies are desired.

It is understood that certificates will be issued by the Ministry of Food for cakes and meals for the following classes of live-

stock, and in accordance with the scale given, to cover the period 26th January, 1919, to 27th April, 1919.

Class of Livestock.	Maximum quantity of Cake or Meal per head for which certificates may be issued for 13 weeks.
I. Dairy Cattle in milk kept under rural conditions	2 cwt.
II. Dairy cattle in milk, stall-fed, and kept under town conditions.. ..	$2\frac{1}{2}$ cwt.
III. Calves under six months	36 lb.
IV. Bulls over six months kept for breeding	2 cwt.
V. Ewes in lamb	42 lb.

Millers' offals of all kinds, screenings, grist meals, brewers' and distillers' grains and malt culms, will be free of control in distribution, but persons who are unable to obtain supplies should apply to the Livestock Commissioner for their area, who will make arrangements for the necessary supplies.

Pig owners and Pig Clubs can obtain millers' offals or grist meals without certificates. Application should be made to the Livestock Commissioner in case of difficulty in obtaining supplies. Provision is made in the general application form for pig owners requiring pig meal, and certificates will be issued against such application, but no guarantee can be given that supplies of pig meal will be available for all certificates that are issued. Applicants unable to purchase must rely on obtaining millers' offals and grist meals.

The Ministry recognise that some provision should be made for goats, in view of their value as producers of milk. Goat owners, however, should be able to obtain supplies of millers' offals or grist meals without difficulty. In case of difficulties, however, the owners should apply to the Livestock Commissioner, who will take the necessary steps to provide approximately 28 lb. per head for billy goats, and 42 lb. per head for nanny goats in milk.

The only variation in price that has occurred since the publication of the following table in this *Journal* of June last, is that of millers' offals. Owing to the change in the milling standard, offals of a much finer quality are now being produced, and, in view of this the Ministry of Food have raised the maximum price from £13 to £14 10*s.* a ton.

Feeding Stuffs Table.

Name of Feeding Stuff.	Fixed Price per ton.	Number of Food Units per ton.	Price per Food Unit.
	£ s. d.		s. d.
Cakes, British Made—			
Linseed cake	19 0 0	111·2	3 5
Cotton seed cake	14 10 0	74·0	3 11
Ground nut, undecorticated ..	17 5 0	103·7	3 3½
,, ,, decorticated	19 0 0	132·8	2 9½
Palm kernel cake	13 15 0	98·5	2 9½
Rape cake	14 0 0	106·3	2 7½
Copra or coconut cake	16 5 0	100·7	3 2½
Sesame cake	18 10 0	129·7	2 10
Soya cake	19 0 0	126·1	3 0
Meals, British Made—			
Extracted palm kernel meal ..	13 10 0	95·2	2 9½
,, rape meal	14 0 0	103·2	2 8½
,, soya meal	18 15 0	124·2	3 0
Cakes and Meals, Imported—			
Linseed cake (average)	19 10 0	115·1	3 5
Egyptian cotton seed cake ..	15 0 0	74·0	4 0
Decorticated cotton cake	19 15 0	120·4	3 3½
,, cotton seed meal ..	19 15 0	126·3	3 1½
Copra or coconut cake	17 10 0	100·7	3 6
Palm kernel cake	15 0 0	100·4	3 0
Rice meal (average)	16 5 0	84·4	3 10
Gluten feed	17 5 0	104·0	3 3½
Maize meal cake	17 5 0	85·5	4 0
Millers' Offals—			
Flour millers' offals	14 10 0	89·0	3 3
Miscellaneous—			
Malt culms	13 5 0	87·7	3 0
Dried distillers' grains	15 5 0	98·6	3 1½
,, brewers' grains	14 5 0	77·2	3 8½
Compound Cakes—			
Containing not less than 7 per cent. oil and 20 per cent. protein ..	17 5 0	100·0	3 5½
Containing not less than 6 per cent. oil and 20 per cent. protein ..	17 0 0	95·0	3 7
Containing not less than 6 per cent. oil and 17 per cent. protein ..	16 17 6	90·0	3 8
Grain, Imported—			
Rye, damaged	15 4 0	89·6	3 5
Wheat, ,, ...	15 4 0	90·4	3 4
Maize, ,, ...	15 4 0	92·3	3 3½
Oats, ,, ...	13 8 0	75·0	3 7
Barley, ,, ...	13 16 0	82·4	3 4
Grain, Home Grown—			
Wheat, unfit for milling	15 5 0	90·4	3 4
Rye, ,, ,, ...	15 5 0	89·6	3 5
Oats, ,, ,, ...	13 15 0	75·0	3 8
Barley, ,, ,, ...	13 16 0	82·4	3 4

Waste Lime from Acetylene Manufacture.

SINCE the present output of lime and lime products is far below the quantity that could be economically used for agricultural purposes, it is very desirable that full use should be made of those industrial by-products which contain lime in one form or another. Of these may be mentioned the lime waste from causticising processes in soap and bleach works, carbonate of lime from munition works, and also the waste lime from the manufacture of acetylene gas. Some idea of the production of these materials may be gathered from the fact that the pre-war consumption of calcium carbide alone equalled about 25,000 tons, which would result in the production of more than 50,000 tons of fresh lime waste per annum.

The main objection to the use of such by-products is that they are generally in a moist condition and in consequence will not bear the cost of transit for long distances. On the other hand, they are largely produced in industrial districts, and it is exactly in these localities that, owing to the continued action of acid fumes from the air, the soil frequently becomes sour, and its productive power suffers in consequence.

Waste Lime from Calcium Carbide.—It is common knowledge that when water is allowed to act on calcium carbide, or carbide of lime, an energetic production of acetylene gas takes place and a residue of slaked lime is left, together with a little dissolved acetylene and any impurities which the commercial carbide may have contained. In general, the amount of the impurities is not likely to rise very high, since it is to the interest of the makers to attain as great a degree of purity of product as possible, but some amount of uncertainty has attached to the possible harmful effect of traces of sulphides and sulphocyanides which have been detected from time to time. With the object of ascertaining whether these impurities were present in sufficient quantity to exercise any deleterious effect on plant growth, experiments were carried out last season by three institutions—Oxford University, Leeds University and Rothamsted—at the request of the Food Production Department. The results of the inquiry are given below.

At Oxford and Rothamsted the experiments were made by means of pot-cultures; at Leeds, garden plots were used. In the case of the pot-culture experiments, the general scheme allowed of a comparison between carbide waste and finely-

divided calcium carbonate, (*a*) applied one month before sowing, and (*b*) applied immediately before sowing. A third portion was allowed to weather by exposure to the atmosphere for one month before application. The material for the experiments was part of a consignment of fresh carbide waste supplied to the Department by a large firm of acetylene manufacturers. It was received in a metal drum, and during transit a certain amount of free liquor had been expressed. This was drained off, and the lime was subjected to a partial drying and sieving before being dispatched to the other centres.

Oxford Experiments (Professor Somerville).—The experiments were carried out in duplicate with two different soils. Unfortunately, the crop yields of the duplicates showed very great variation, and it is doubtful whether the calculation of the mean crop weights would serve any useful purpose. It may be mentioned, however, that the heaviest crop in each of the two series was given, in one series by soil treated with carbide waste at the rate of 1·0 per cent. at the time of sowing, and in the other series by soil treated with 5·0 per cent. of carbide waste one month before sowing. With neither of the soils was there any definite evidence of injury by the applications.

Rothamsted Experiments (Dr. H. B. Hutchinson).—Three series of tests were carried out. In the first series, carbide waste was applied to an acid soil at the rate of 0·5 per cent. (3·3 tons per acre—top 6 in.). The treatments and the yields are given below:—

	Mean Dry Weight of Crop.
Control	0·65 grms.
Calcium Carbonate, applied one month before sowing	27·10 "
Carbide waste, applied one month before sowing	27·35 "
Calcium Carbonate, applied at time of sowing ..	25·05 "
Carbide waste, applied at time of sowing ..	28·35 "
Carbide waste, exposed one month,* applied at time of sowing	22·90 "

* (Sample flooded during exposure).

The value of carbonate of lime and of the carbide waste was therefore practically identical, whether applied one month before sowing, or at the time of sowing.

Two sets of germination tests were also carried out. In these the carbide waste was applied at the rate of 1·0 and 3·0 per cent. of the soil, respectively, *i.e.*, 6·6 and 20 tons of lime

per acre (top 6 in.). Barley and mustard seeds were sown immediately after treatment, and gave the following mean germinations. In the presence of 3·0 per cent. of carbide waste germination of the seeds was slightly retarded, but after ten days the results were identical with those of the control plots—

	Control.	*1·0 per cent. Carbide Lime.*	*3·0 per cent. Carbide Lime.*
Barley (12 seeds) ..	10·5	10·5	10·5
Mustard (20 seeds) ..	18·5	19·5	18·0

The three series thus indicate that when carbide waste is well broken down it may be applied in fairly large quantities without giving rise to injurious effects.

Leeds Experiments (Dr. Hanley).—The work was carried out on a light coal-measures loam, with plots 1/1,200th of an acre in area. One plot served as control, a second received carbide lime at the rate of 3 tons per acre, and the third received an equivalent quantity of ground chalk.

The applications of lime and chalk were made on 30th April, and on 1st May the plots received a dressing of fertiliser at the rate of 4 cwt. of superphosphates and 1 cwt. of sulphate of ammonia per acre. Barley was sown on the latter date. Germination was normal throughout, and during the growing period there was no noticeable difference between the carbide waste and chalk plots. Both the limed plots showed a marked superiority over the unlimed plot from the start, and this was greatly accentuated by the drought. This affected all three plots, but very few plants on the control plot survived it. The crop was cut on 20th September, and gave the following results :—

	Weight of Barley in Green Condition. (Straw and Grain.)
Control plot	100 grms.
Carbide waste plot	4,800 ,,
Chalk plot	4,900 ,,

The results are thus in accord with those of the experiments reviewed above.

In practice the main difficulty attending the use of such industrial residues arises from the wet condition in which they are produced, but this difficulty may be surmounted, and fairly efficient incorporation of the lime with the soil achieved, by making the application in autumn, winter or early spring, and allowing the lime to weather down and become friable. Moderate dressings would be at the rate of about ¼ cwt. per rod.

Third Interim Report of the Committee on the Production and Distribution of Milk.*

THE Third Interim Report of the Committee on the Production and Distribution of Milk is a record of the activities of the Committee since the issue of their last report. Some of the recommendations which it contains have already been adopted and are in operation, and to that extent the report may appear to have been issued rather late. It should be pointed out, however, that the Committee reported their more important decisions immediately to the Department of State concerned, in order that they might receive consideration at the earliest possible moment.

The objects aimed at by the Committee, as well as the main recommendations and conclusions arrived at, may be summarised in the following order :—

1. The Committee's policy has been, firstly, to try to maintain as far as possible the volume of milk previously produced ; secondly, to distribute it fairly in accordance with the needs of the community ; and, thirdly, to consider what steps are necessary to develop and increase the dairy industry after the War. That such development is necessary is illustrated by some interesting tables showing that the increase in cow population has not, in Great Britain, kept pace with the increase in the human population. If the cow and the human populations in the year 1871 are taken in each case as 100 it is shown that, in 1914, the human population had increased to 160, whereas the cow population has been raised only to 140. Further, the value of the dairy produce imported into the United Kingdom during the same period increased by almost 400 per cent.
2. The need for controlling, during the War period, the wholesale distribution of milk, became evident during the Committee's discussions on the desirability of rationing, when practically all the evidence showed that such shortage as existed during the winter of 1917-18 was to be attributed largely to want of organisation in distribution.
3. In the opinion of the Committee the first vital requirement for the maintenance of an adequate supply of milk is a guarantee to the producer of such a price for milk as will encourage and enable him to meet the special difficulties brought about by the War.

* Summaries of the 1st and 2nd Interim Reports of the Committee were published in this *Journal*, July, 1917, p. 450, and January, 1918, p. 1133.

4. The Committee state that, in their opinion, it would b in the interest of the consumers if, instead of having a flat rate for winter and summer milk, it became a recognised practice to charge a higher price in winter when the cost of production is high, than is charged in summer when the cost of production is low.

5. The Committee hold the opinion, with regard to the pasteurisation of milk, that whatever the merits or otherwise of the process may be, pasteurised milk should be sold as such, and not as fresh milk, and further that it should have been properly pasteurised, *i.e.*, in such a way as to afford the maximum of protection to the consumer as may reasonably be expected from the process when carefully applied.

6. The Committee recommend the adoption of a scheme under which a producer who keeps his herd free from tubercle and fulfils certain requirements in his method of production, can obtain a licence authorising him to charge a price above the maximum fixed for ordinary milk. They express the opinion that cleanly production and proper cooling would effect a considerable reduction in the loss now sustained through souring.

7. The information obtained through witnesses and through the Agricultural Wages Board leads the Committee to the conclusion that unless dairy farmers are prepared to adapt themselves more nearly to modern conditions of labour as practised in other industries, they cannot hope for success in the competition of labour.

8. While approving of the general principles of the scheme adopted for the allocation of concentrated feeding-stuff for the use of dairy cattle, they urge that considerable elasticity should be allowed in its application, in order that variations in climate and method of feeding may be taken into account.

9. In order to minimise the milk shortage and to render milk more available for the more necessitous purposes thereby ensuring as far as possible, the effective application of the priority scheme for supply to children and invalids, the Committee recommend that there should be a reduction in the amount of milk consumed by factory workers and by the Navy and Army; and that the use of milk in the manufacture of chocolate and sweets should be prohibited.

10. The Committee recommend that in the case of necessitous children under school age the sanitary authorities should be empowered to distribute milk free or to sell at a reduced price.

11. The Committee reiterate their recommendation that with a view to the accumulation of stocks of milk products during the flush season, all surplus milk should be converted into dried and condensed milk, cheese or butter, for use during the winter. They also recommend that the Order prohibiting the use of cream for any purpose other than for the manufacture of butter should be continued.

12. The Committee recommend that every encouragement should be given in establishing co-operative milk depots near the source of milk production, by Government loans, and that assistance should be given to recognised bodies to empower them to requisition suitable buildings, if necessary, in localities where it is desirable to establish depots.

13. The Committee urge that everything possible should be done to remove any difficulties which operate against the maintenance and increase of the milk supply. In this connection they refer to the provision of more labour; assistance in obtaining machinery and dairy equipment; and the provision of advice, literature, etc., concerning the most approved methods of production.

14. Attention is drawn to the possible development of arable dairy farming, as well as to the need for further experiments and demonstrations concerning the use of milk substitutes in the rearing of calves.

15. In order that veterinary assistance to dairy farmers should not be too seriously depleted during the War, the Committee suggested that veterinary students who have completed their first professional examination and are serving in non-veterinary functions in the Army should be demobilised in order that they may continue their studies, and that a student completing his first year of study should not be called up.

16. It is advised that farmers should be encouraged to keep more accurate and detailed accounts, and that a system of account keeping should be devised for their use and every assistance provided where necessary.

17. The Committee consider that the extension and development of the practice of milk recording is a matter of great importance to the dairying industry.
18. The future work of the Committee will be to deal more fully with these matters, including the supply of farm labour, and dairy education.

Green Crops for Soiling Dairy Cows.

THE Third Interim Report on the Production and Distribution of Milk contains in an appendix several memoranda on the use of green crops for soiling dairy cows. These memoranda are as follows:—

Arable Acreage Required for Green Crops for Soiling Dairy Cows.—Estimating that an average dairy cow would require 70 lb. of green meat daily.

Lucerne.—1 acre, 5 tons per acre (moderate crop), would yield 70 lb. of green food per square rod; therefore, 1 acre (160 square rods) produces 160 days' feed from a single cut, 320 days' feed if cut twice, and, say, 450 days' feed if cut three times.

Rye.—1 acre, 7½ tons per acre (moderate crop), would yield 70 lb. of green food per ⅔ square rod; therefore, 1 acre (160 square rods) produces 213⅓ days' feed.

Tares and Oats (mixed).—1 acre, 10 tons per acre (good average crop), would yield 70 lb. of green food per ½ square rod; therefore, 1 acre (160 square rods) produces 320 days' feed.

Maize.—1 acre, 20 tons per acre (average crop), would yield 70 lb. of green food per ¼ square rod, therefore, 1 acre (160 square rods) produces 640 days' feed.

Commence feeding rye 15th April, and continue till 15th May	30 days.
Commence feeding tares and oats 16th May, and continue till 14th August	90 "
Commence feeding maize 15th August, and continue till 30th September	47 "
Total	167 "

Cabbages, turnips, mangolds to follow on.

Note.—There would be two sowings of rye, the first at the end of August and the second at the middle of September. Five or six sowings of tares or vetches would be needed, one of winter tares and oats in the autumn, one sowing early in February, if possible, and three or four later sowings.

Mangolds for winter food would probably follow the early rye, maize and Drumhead cabbage the later rye, and white turnips the autumn-sown tares and oats. Winter oats and wheat should be sown after the later tares and oats and also after the maize, cabbage and mangolds.

In this manner half the arable would be under corn each yea and half under green crops. The Lucerne should be in additio in case of drought or crop failure. If not required for feedin it could be cut up for hay or ensilage.

R. HOBBS, Jun.

Partial Substitution of Green Crops for Pasture. — I think th following might be taken as about what might be done unde favourable conditions. In many cases, however, it would no be possible owing to the land being unsuitable, such as we and heavy land, and the impossibility of increasing the labour in some cases intensified by lack of cottages.

For a dairy of 60 cows in milk the green crops grown migh be as follows :—

Crop.	Acres.	Sown.	Cut.
Rye	2	Sept. or Oct. ..	April and May.
Winter barley ..	2	Sept. or Oct. ..	May.
Trifolium	3	Sept.	June.
Cabbage	3	(Planted) March .	July and August (autumn sown plants).
Maize	2	May	Sept. (grown after winter barley).
Late cabbage or marrow-pith kale.	5	(Planted) June ..	Oct. to March (grown after rye and trifolium).
Mangold	15	April and May ..	Last all winter.
Lucerne	3	—	Hayed the first time, and then mown twice.

The acreage of above must necessarily vary very much indeed, according to the soil, etc. This remark applies also to the pasture required; but if the above crops are grown successfully, about three-quarters of an acre per cow might suffice up to such a time as the aftermath was ready in the meadows which had been mown.

I am of the opinion that a good deal might be done, subject of course, to labour being available and soil and other conditions suitable, in growing food comparatively rich in albuminoids to take the place of imported foods, with a view to making a farm self-supporting as far as possible. Lucerne tares and oats might be grown for silage and hay, clover fo hay, linseed, beans—where soil is suitable, peas and possibly lupins for grinding.

Speaking generally, it will be found that the herds which run out most to pasture are healthier than those more confined in buildings and fed on a soiling system.

T. C. ROBINSON.

Period of Supporting Dairy Stock on Various Crops.—There are various crops other than grass in a green or a dried state which are suitable for feeding dairy stock, but they can be most economically used as an addition to a ration of grass, hay, or straw chaff rather than as an entire substitute.

For this reason the following estimates are based on the assumption that the crops suitable for consumption during the summer months are utilised to eke out the supply of grass when this is getting short, and that, during winter and early spring, straw chaff, *ad lib.*, or hay, either long or chaffed, is available as food for the cows in addition to the crops recommended to be grown on arable land.

The weight per acre of the following crops varies very much according to the season, the nature of the soil on which they are grown, the amount and value of the manure used to stimulate their growth, and the skill employed in their cultivation.

It must, therefore, be clearly understood that the following estimate can be only a very rough guide as to the period for which a herd of 40 cows in milk can be fed on an acre of each of the following crops, and that it is understood that the cows receive in addition some grass, hay or straw chaff.

Estimated period for which a *herd of forty cows* in milk can be maintained on 1 acre of each of the following crops :—

Name of Crop.	Period when the Ration is 70 lb. per Head per Day.	Period when the Ration is 56 lb. per Head per Day.
Mangolds	12 to 24 days	15 to 30 days
Swedes or kohl rabi	9 „ 14 „	12 „ 18 „
Turnips, white	8 „ 11 „	10 „ 14 „
"Drumhead" cabbage	11 „ 16 „	14 „ 20 „
"Enfield" cabbage	8 „ 11 „	10 „ 14 „
Marrow-fat kale	8 „ 11 „	10 „ 14 „
Thousand head kale	8 „ 11 „	10 „ 14 „
Rye	3 „ 6 „	4 „ 8 „
Tares	2 „ 6 „	6 „ 10 „
Tares and oats, etc., mixture	4 „ 8 „	6 „ 10 „
Maize	11 „ 16 „	14 „ 20 „
Lucerne	5 „ 9 „	7 „ 11 „

F. N. WEBB.

Soiling Crops for Dairy Cows.—Soiling crops, when sown in suitable varieties and acreage, will provide green food to supplement pasture for cows from the middle of April until the beginning of October or later. In specially favourable circumstances soiling crops might even entirely replace pasture,

but under present conditions in England it is not necessary to do more than consider such crops as supplements to pasture.

The crops most suitable for soiling purposes in the south, south-west, south Midlands and east of England are rye, tares and oats mixture, and maize with additional crops, such as winter barley, trifolium and lucerne, where conditions are suitable. The approximate acreage required for a summer's supply for a herd of 40 cows, allowing 56 lb. green food daily per cow, is :—

Rye (2 sowings) used from mid-April to mid-May. (Part may be replaced by winter barley)	4 acres.
Tare and oat mixture (5-6 sowings) used from mid-May to mid-August. (In June part may be replaced by trifolium)	9-12 ,,
Maize used from mid-August to October	2-3 ,,

Wherever possible 4 to 8 acres of lucerne or lucerne mixture should be laid down to act as a reserve in case of a drought or crop failure ; when not required for cows it can be cut for other stock or made into hay. At least two, and usually three, cuttings of lucerne can be obtained annually.

The growing of soiling crops and the cutting and carting daily to stock requires much more labour than the mere grazing of cows on pasture throughout the summer; hence, farmers who are asked to plough up grass land and to maintain their dairy herds partly on the soiling system should be enabled to obtain labour over and above that required for the extra acreage of grain and potatoes grown. Also, the growing and feeding of soiling crops adds materially to the cost of production of milk during summer as compared with production of milk on pasture only.

In the past, the use of soiling crops during summer has not been a universal or even a common practice in the dairying districts of England; hence, many farmers, who now have to plough up some of their pasture and are advised to grow soiling crops, have had little or no experience of such crops ; the methods of sowing, cultivation, and general management are imperfectly understood. Farmers in this position should be provided with detailed and reliable information as to how the various crops can be grown and utilised with the greatest success, and the County Agricultural Organisers and other advisory officers should be asked to give special attention to this aspect of their work.

Where County War Agricultural Committees have taken over the management of a dairy farm or farms, demonstra-

tions in the growing and utilisation of soiling crops should be given. It is most important, in view of the official advice given, that the dairy herds be maintained on such farms.

As the breaking up of pasture is almost certain to be continued during the autumn, winter and spring of 1918-19, the need for accurate and additional information on the soiling system is self-evident, and agricultural colleges and farm institutes maintaining herds of cows on their own farms should be asked to undertake the demonstration on as large a scale as practicable of the maintenance of dairy herds during the summer on the minimum acreage of pasture, and during the winter on rations sufficient for normal milk production, but without, or with the minimum of, concentrated foods.

In so far as practicable under present conditions, experiments should be carried out on the suitability for different conditions of soil and climate of different varieties and different mixtures of soiling crops, and on the possibility of reducing the labour in cutting and carting.

Owing to the value of lucerne—

(*a*) as a green food or as hay rich in proteins, thus reducing the need for concentrates;

(*b*) as a soiling crop giving two or three cuts annually for four to six years, thus saving labour in cultivation;

(*c*) as a nitrogen-collecting crop, thus enriching the soil for succeeding crops;

it is desirable that all the experimental work of recent years on this crop should be examined and such results as are valuable to the farmer published and distributed, and that steps should be taken to demonstrate more fully the value of lucerne in districts where it has been successfully grown, to carry out trials in districts where it would supply a felt want, and to carry out experiments on such points as a survey of present information may show to require further investigation.

J. MACKINTOSH.

Milk from Goats.

THE Sub-Committee of the Committee on the Production and Distribution of Milk appointed to inquire into and report whether it was desirable and, if so, what steps should be taken, to encourage the keeping of goats for milk production, have arrived at the following conclusions:—

1. That it is advisable to take immediate steps to encourage the increased production of goats' milk, particularly in rural districts where there is any shortage—or threatened shortage—of cows' milk.

2. That the Committee should formulate a definite scheme for that purpose.

With a view to assisting in the increased production of goats' milk the Sub-Committee suggest the following scheme for the consideration of the Committee :—

1. The formation of a Central Committee to undertake all the necessary work for the improvement in type and the increase in numbers of goats in this country. This Committee should include members selected for their special knowledge of, and interest in, goats, together with representatives of the Boards of Agriculture, the Local Government Boards and the Ministry of Food.
2. The establishment of central stud farms for goats in England and in Scotland.
3. The obtaining of a Government grant for :—
   (*a*) Purchasing or renting the necessary land and premises for the stud farms.
   (*b*) Management of the stud farms.
   (*c*) Stocking of the stud farms.
4. The formation of local clubs throughout the country for :—
   (*a*) Improvement in feeding and management of goats.
   (*b*) The placing of stud goats in suitable centres.
5. The provision of expert advisory services in goat management and for the inspection of the working of the local clubs.

The duties of the Central Committee would include the following :—

(*a*) The general management of the scheme outlined above.
(*b*) The issue of educational literature amongst goat-keepers and the encouragement of interest in the scheme.
(*c*) The arrangements for importation of male blood stock.
(*d*) The establishment of local clubs.
(*e*) The arrangements for exhibits of and classes for goats at live-stock and other shows.
(*f*) The encouragement of the study of goat diseases by veterinary surgeons.
(*g*) The keeping of all desirable records in respect of milk yield and quality, pedigrees, registers of non-pedigree stock, etc.

The Committee attach great importance to the establishment of central stud farms and have been given to understand that, so far as England is concerned, suitable premises are available.

Working of Small Holdings Acquired under the Small Holdings and Allotments Act, 1908.

THE following Note is abstracted from the Report on the Working of Small Holdings acquired under the Small Holdings and Allotments Act, 1908, recently presented to Parliament* :—

The Board recently circularised County Councils in order to obtain information with regard to the measure of success which had attended the small holders placed on the land under the provisions of the Small Holdings and Allotments Act, 1908. The Board realised that the majority of the County Councils were working with depleted staffs, but, in view of the problems which are under consideration with regard to land settlement, it was felt that the present was a suitable time to obtain information as to the result of the working of the Act.

The subjoined table has been prepared showing, as far as practicable, the result of the Board's inquiry. Particulars are not available as regards certain counties, owing to the fact that some of the Councils' Small Holdings staffs have been so depleted either by the calls of military service or the demands made on the time of officials who are working for the Agricultural Executive Committees which have been appointed to deal with questions of ploughing up grass land, cultivations, etc., etc., and, as an instance of the difficulties under which County Councils are labouring, the case of the County of Hampshire may be quoted. The gentleman who was appointed Small Holdings Officer in this county in 1909 left in May, 1914, to take up another appointment, and is now serving in the Army; his assistant during the greater part of his period of service has been killed in the War. The successor to the Small Holdings Officer, who continued to hold the office until he joined the Army, is now wounded and missing; his assistant has been killed in the War, and the gentleman who acted as temporary officer has also been taken into the Army and is serving abroad. The County Council are making the best arrangements they can for carrying on the existing holdings, and the members of the County Council have themselves been good enough to view the small holdings from time to time with a view to seeing whether their cultivation is properly maintained.

* Cd. 9203, 1918, price 1*d*. To be obtained from H.M. Stationery Office, at the following addresses: Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester; 1, St. [illegible] Ponsonby,

Table showing Numbers of Councils Tenants and Failures, together with Particulars of Rents Collected, Outstanding and Irrecoverable.

COUNTIES.	Total number of Council's tenants.	No. of tenants who have quitted (excluding those who have died, joined the Army, or taken holdings elsewhere).	Number of tenants who must be regarded as failures.	Total acreage occupied by such tenants.	Percentage of failures to total number of tenants.	Percentage of acreage occupied by such tenants to total acreage acquired or agreed to be acquired up to 31st Dec., 1914.	Total rents collected since 1st Jan., 1908.	Arrears of rent.		Percentage of irrecoverable arrears to total rents collected.
								Out-standing.	Irre-cover-able.	
ENGLAND.					Per cent.	Per cent.	£	£	£	Per cent.
Bucks	235 & 3 Assocns.	—	—	—	—	—	47,302	50	27	·06
Cambridge	1,440	113	103	—	7	—	94,427	67	17	·02
Cheshire	181	5	5	112	2·7	2	81,142	6	16	·02
Cornwall	158	23	13	409	8	13	33,246	7	17	·05
Cumberland	—	14	8	193	—	38	—	—	—	—
Dorset	147 & 3 Assocns.	1	1	47	·6	2	28,459	10	8	·03
Durham	277	3	3	150	1	6	21,550	32	123	·6
Essex	192	52	47	373	24·5	9·5	35,355	18	125	·04
Gloucester	337	32	13	64	4	2	44,363	159	60	·13
Hereford	70	16	12	320	17	16	27,747	nil	136	·49
Herts	199	48	26	364	13	12	32,307	122	194	·6
Hunts	404	6	4	104	1	2	78,011	nil	115	·14
Isle of Ely	1,150	—	—	—	—	—	82,431	2	62	·07
Isle of Wight	53	7	3	78	5·7	8·3	10,443	18	24	·02
Lancaster	71	14	13	30	18	6	11,752	nil	218	1·8

Lincoln :—										
Holland	493	—	nil	—	—	—	116,131	nil	nil	nil
Lindsey	217	8*	6	240	2·8	5	51,561	44	4	·008
Middlesex	32	10	7	60	22	27	5,169	25	21	·04
Norfolk	1,350	144	77	824	5·7	6	151,286	61	91	·006
Northants	132 & 14 Assocns.	15	6	61	4·5	2	28,191	7	nil	nil
Northumberland ..	75	17	12	320	16	11	33,067	67	310	·9
Oxford	210	—	26	391	12·4	11·7	32,266	42	36	·01
Rutland	34	nil	nil	—	—	—	2,886	nil	nil	nil
Salop	—	—	nil	—	—	—	—	—	—	—
Somerset	550	43	15	340	2·7	3·7	137,410	58	112	·08
Stafford	117	15	12	266	9·5	8	39,185	100	263	·7
East Suffolk	83	—	—	—	—	—	11,288	11	61	·05
West Suffolk	231	—	—	—	—	—	22,924	64	14	·006
East Sussex	25	12	11	194	44	53	2,952	—	34	1·2
West Sussex	15	3	3	29	20	14	2,872	18	17	·6
Warwick	128	19	8	73	6	3·7	24,785	—	2	·008
Westmorland	10	3	2	21	20	22	—	—	—	—
Wilts	312	19	18	310	5·8	5	55,410	123	21	·04
Worcester	500	16	11	111	2·2	4·4*	33,991	22	78	·02
Yorks :—										
East Riding	223	36†	14	—	6·3	—	48,333	nil	14	·03
WALES.										
Anglesey	79	nil	—	—	—	—	—	nil	nil	nil
Brecon	26	—	nil	nil	nil	nil	3,218	nil	nil	nil
Carmarthen	66	—	1	—	1·5	—	8,591	nil	nil	nil
Carnarvon	77	2	2	87	2·5	3·8	14,556	8	15s.	·005
Denbigh	175	3	3	100	1·7	2·5	30,233	nil	14	·04
Flint	51	6	6	112	3	11	12,787	19	63	·5
Montgomery	100	1	1	—	1	—	23,389	nil	nil	nil
Pembroke	47	1	1	—	2	—	11,216	nil	nil	nil

* Notices given by Council. † Including deaths.

Where particulars are not inserted in the table as regards any county no meaning can be attached to the absence of information, other than the fact that the Council's staff were unable, in addition to their current work, to furnish the return asked for by the Board.

An examination of the figures showing the relatively small numbers of failures amongst small holders settled on the land under the Act, and the almost negligible amount of arrears of rent written off by Councils as irrecoverable, indicates clearly that the results obtained under the Act may be regarded as successful, such as would conpare favourably with those obtained on private estates. The personal equation will, of course, always enter largely into the question of the success or failure of a small holder. It may be noted that in many cases where small holders have failed, other tenants have been obtained by the Council, who, in contrast to their predecessors, have made the holdings profitable, thus indicating that neither the land nor equipment caused the failure, but some lack of energy, experience or capital on the part of the original small holder.

Land Drainage.

CONSIDERABLE interest has been aroused in various counties in the question of improving the main drainage of land for agricultural purposes. The Board of Agriculture have received requests to initiate drainage authorities upon rivers so wide apart as the Yorkshire Ouse and its tributaries, the Welland, the Great Ouse, the Wey and the Mole, the Upper Severn, the Clwyd, and the Dee. The necessary inquiries in these and other areas are being instituted by the Land Drainage Section of the Board's staff, with the co-operation of the Ordnance Survey, and it is hoped that it will not be very long before the necessary Orders can be drafted.

The Land Drainage Acts and Regulations provide ample opportunities for objections on the part of those concerned as well as for consultation with the County Councils affected; and the drafting of an Order for the proposed area must be regarded as only the first step in the establishment of a drainage authority. The proceedings will, however, be carried out as promptly as is compatible with the interests involved; and now that the necessity and usefulness of the main drainage

channels have been conclusively demonstrated it may be hoped that there will be little opposition in principle to the proposals made. When the drainage authorities have been set up, it will be for each of them to consider what are the best measures to be carried out for improving the area under their jurisdiction. They will possess both rating and borrowing powers, but no one is liable to pay rates to a drainage authority except in respect of land which is benefited by the work.

The Board of Agriculture are inviting County Councils to form standing committees for consultation with the Board upon any proposed Orders establishing drainage authorities or altering the boundaries of existing drainage areas. It is highly important that these matters should be freely and constantly discussed between the Board and the County Councils without the delay which would be entailed by a separate reference in each case. The Board are also prepared to delegate to a committee for each county their powers under Part II. of the Act of 1918 for securing that the powers of existing drainage authorities are efficiently exercised, and for carrying out the schemes authorised by the Act in small areas, in which the establishment of a separate authority would not be appropriate. Such a "drainage committee" will comprise a majority of county or county borough councillors and will consist, as a rule, of eight members appointed by the Councils and four by the Board. Where the committee propose to exercise the powers of an existing drainage authority the authority will have a right of appeal to the Board. These provisions will be found in the *Land Drainage (Constitution of Authority)* Regulations, 1919*, which have been made by the Board under the Act of 1918.

A considerable amount of clearance has been done and is still being done by means of prisoners of war on many rivers and drainage areas in England and Wales; for instance, on the Waveney, Yare, and other Norfolk rivers, on the Mardyke in Essex, and on the River Birkett, and the Frodsham Marshes in Cheshire. A marked improvement has been effected by this means in the valley of the Ivel, where a considerable area of valuable market garden land near Biggleswade has been saved from floods this autumn and winter. So successful have these operations been that the Executive Committees of Bedfordshire, Huntingdonshire, and Cambridgeshire have applied for the services of several hundred prisoners to clear out the upper

reaches of the Ouse, into which the Ivel flows; and the prisoners are being sent as accommodation is got ready. The work is being commenced on the by-channels with which the Ouse here is provided, and which are not too deep or full to be capable of being dealt with in the winter. On 20th December, after all the heavy rain that had fallen, the water in the cleansed portion of the Ivel was not more than half way up the banks.

Land Drainage: Remarkable Figures from Yorkshire.

DURING 1918 and 1917 the subject of improving the main-drainage channels has been taken up with great enthusiasm in Yorkshire among other counties; and remarkable results have been achieved at a comparatively small cost. The low-lying lands around Doncaster and on the north bank of the Humber are provided with drainage systems which have long existed; but many of these were in a state of great neglect when the Agricultural Executives of the East and West Ridings turned their attention to this matter in the spring of 1917.

In the East Riding the cleansing of the Greenoak Goit was completed in 1917, and about 2,000 acres were greatly improved thereby at a cost of £600. Work on the Bellasize Drain was completed in October, 1918, in spite of difficulties caused by the shifting nature of the sandy clay soil. The drain is now said to be working more efficiently than it has done for 70 years past; and an area of approximately 4,000 acres has been greatly benefited at an expense of about £1,200. The water in the Market Weighton Canal (which forms the outlet of the River Foulness) has been substantially lowered by the regulation of the lock gates giving on to the Humber, and the cleansing of the canal is being carried out; the area which will ultimately be benefited by this work extends to about 20,000 acres. The Committee have commenced work upon the clearance of the Howden drainage system.

The following is a brief summary of the principal work carried out by the West Riding Agricultural Executive Committee:—

West Moor and Parks Drains.—Area improved, 3,327 acres; area reclaimed, 700 acres; estimated cost, £1,365.

Tickhill.—Area improved, 2,750 acres; area reclaimed, 200 acres; actual cost, £364 18*s.* 4*d.*

Thorne.—Area improved, 13,000 acres; area reclaimed, 200

Cowdall.—Area improved, 700 acres; estimated cost, £250.

River Don.—Area improved, by clearing a short and much congested reach, 40,000 acres; estimated cost, £500.

Awkley Bridge (River Torne).—Area improved, 2,000 acres; actual cost, £17; arches altered by County Council and other work undertaken by private owners.

Awkley and Blaxton.—Area affected, 2,500 acres; estimated cost, £50.

Doncaster and Balby Car.—Area improved, 300 acres.

Lower Anker Drain.—Area improved, 250 acres; estimated cost, £140.

Tranmoor Drain.—Area improved, 150 acres; estimated cost, £50.

Little Went Drainage.—On representation by the Committee the Little Went has been cleaned out by co-operation of adjoining owners; this is not known to have been doue before at any time, and the improvement is considerable.

The Committee and their Chief Executive Officer also undertook with great promptitude the repair of the disastrous breaches in the banks of the Ouse and the Aire which occurred in September, 1918.

The above are given only as examples of the results that can be achieved by manual labour alone without mechanical appliances, such as steam dredgers or pumping engines.

Other counties have not lagged behind; and similar work has been done (to give only a few instances) in counties so far apart as the North Riding of Yorkshire, Norfolk, Berkshire, Cheshire, Lancashire and Flintshire.

A Use f r Duckweed.

THE attention of the Board has been directed to the possible use of duckweed (*Lemna*) for feeding ducks and pigs. According to Mayer,* the plant contains 1·8 per cent. of albuminoids in the wet state, and in the dried condition, 23·8 per cent. of albuminoids, 3·9 per cent. of oil, 36·7 per cent. of carbohydrates, 9 per cent. of fibre, and 18·1 per cent. of ash. When cooked, the weed is stated to be a good food for pigs and poultry.† Owing to the difficulty of collecting the weed, and the comparatively small quantity obtainable from a fairly large area, it is scarcely practicable to collect it for pigs.

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* A. Mayer, *Tidjskrift voor Landbouwkunde*, 2, 51.

† Emil Pott, *Handbuch der tierischen Ernährung und [illegible] lichen Füttermittel*, 1907.

The numerous polypera, mollusks, insects and their larvæ which are to be found underneath the leaves, however, are eagerly sought after by ducks, which devour considerable quantities of the weed. There are numerous large ponds and swampy areas in this country which abound in duckweed and other water weeds, and it is suggested that ducks might profitably be more extensively reared in such areas, so utilising to the full the natural food supplied by such weeds, and the animal life with which they are associated. So reared, ducks require little concentrated food after they are a month old.

A Heavy Crop of Onions.

THE Board have received some interesting particulars of a remarkable crop of onions grown on an area of 46 rods by Mr. A. J. S. Cousins, of Eastville, Bristol. The onions were pulled in a partially green state and gathered in baskets, each basket holding about 1 cwt. Altogether 172 basketfuls were collected, Mr. Cousins estimates that every 5 basketfuls will give 3 cwt. of dry or marketable onions, and on this estimate the crop works out at approximately 18 tons per acre.

Mr. Cousins states that part of the land was planted with cabbages in October, 1916, and manured with stable manure at the rate of 100 loads per acre. Celery was planted in July, 1917, and the onions (Bunting's "Up-to-Date") were sown in 1918, each time without the application of manure.

Bee-keeping: Food Production Department's Schemes.

THE Food Production Department has for more than twelve months been advising villagers to keep more bees, and its advice has been extensively followed by rural residents. The Department has also by means of lectures and demonstrations, the supply of simple, practical leaflets and other measures, been showing villagers how bees may be kept profitably. Bee-keepers generally throughout the country were greatly discouraged and suffered serious loss by reason of the epidemic of Isle of Wight disease, which wiped out the large majority of the stocks of English bees and has only this year shown signs of abatement. For several years past a Government scheme for providing bees with medicated candy for winter feeding has been in operation; and it is probable that the consequent strengthening and stimulation of the remaining stocks in the country has had a bearing on the decreasing virulence of the bee plague.

Bee-keepers requiring bee food for spring feeding must register with the Secretary of the Horticultural Sub-Committee of the Agricultural Executive Committee for the county, from wh[illegible]

Early in the past year the Food Production Department set up a Bee Section, to which the Secretary of the National Bee-keepers' Association is attached; and this section, by means of the systematic inspection of apiaries and advice to bee-keepers, has done much to restore confidence and to place the future of the industry of bee-keeping on a more satisfactory basis. With a view to the prompt and successful revival of the industry, the Department has lately urged the Horticultural Sub-Committees of the counties to organise local bee registration and re-stocking schemes through Bee Committees in co-operation with the local Bee-keepers' Association. It is hoped that growers of fruit in particular will assist, enthusiastically, the development of these schemes. The importance of bee-keeping to the fruit grower can hardly be overstated. Experiments made have proved that if a hive or two of bees is kept within a furlong (220 yards) of a fruit plantation 80 per cent. of the fertilisation is done by hive bees.

Up to 3rd January 23 counties had agreed to form Bee Committees on the lines suggested by the Food Production Department for the purpose of carrying out the scheme of registration and re-stocking.

Allotment Progress.

THE first Allotment Inspector was appointed by the Food Production Department on 3rd December, 1917; and the Department has just issued a statement dealing with the work of its allotment inspectors for the twelve months ending 3rd December, 1918. From this statement it appears that with the assistance of the inspectors local authorities have laid out new allotments during the past year at the rate of over 1,000 acres per month. Upwards of 20,000 acres of land were inspected with a view to their possible use as allotments; 12,610 acres were actually acquired for the purpose, representing approximately 180,000 new allotment plots arranged for in the twelve months. The greater number of these plots, it may be added, are in urban areas, and form parts of comparatively small pieces of ground.

The past year's figures show that there is little, if any, abatement in the demand for allotments, and that the domestic food production movement is likely to remain a permanent feature of the national economy. They compare, not at all unfavourably, in the circumstances, with the figures for the previous year. In the twelve months ending 31st December, 1917, about 17,000 acres, or 204,000 allotments, were laid out by local authorities. In comparing the figures of 1917 and 1918, it should be remembered that the former include a considerable area of unoccupied land which was immediately available when powers under D.O.R.A. were first given to the allotment authorities in December, 1916. Obviously, after this land had been apportioned the difficulty of finding further suitable ground for allotments was increased.

Negotiations with local authorities and landowners with a view to the development of the allotment area represent only a part of the work done by the Allotment Section of the Department. In a considerable number of cases, for one reason or another, notice was given to allotment holders to vacate their plots. When appeal has been made in these circumstances to the Department inspectors have taken up the matter for the purpose of securing a cancellation of the notice, or obtaining other land and fair compensation for the tenants. Many claims for compensation by owners have also received the attention of the inspectors, who, moreover, during a campaign amongst farmers

in the spring, succeeded in obtaining promises for the planting this year of an additional area of about 20,000 acres of potatoes on the farms.

A surprisingly large amount of food has been produced during the past year on some of the allotments of Outer London. As an instance the Food Production Department gives figures referring to the Beckenham area. In this district 500 allotment holders produced 800 tons of potatoes, 51 tons of onions, and 250,000 cabbages, as well as a considerable quantity of other vegetables, their allotments averaging 10 poles each.

Manufacture of Potato Flour.

FOR the guidance of persons who desire to start factories for the manufacture of potato flour, the Director of Vegetable Preservation (100, Cromwell Road, S.W. 7) has issued a prospectus. In any potato-growing district where a factory can command supplies without recourse to the railways it is assumed that a maximum of eight flaking machines may be installed in one factory, and estimates are given for such a factory.

The floor area required, including boiler and engine rooms, office accommodation and all else, is about 10,000 sq. ft., of which 4,500 sq. ft. will be needed for storage and 1,500 for buildings to accommodate the flaking machines. These buildings should not be less than 20 ft. high; in other parts of the area lower buildings may serve. An 8-unit factory will be capable of handling about 300 tons of potatoes weekly, and will consume about 10 cwt. of coal per working hour. The machinery peculiar to the process will be supplied at cost price by the Ministry. Some of it is available for immediate delivery, together with a limited number of boilers and engines in certain sizes. Piping, shafting, and accessories must be provided by the contractor, who, however, will be helped with priorities and other facilities.

The capital expenditure incurred in establishing a factory will, of course, depend upon its position and the extent and nature of buildings and plant in being. Assuming, however, that buildings, boilers, and power for driving are already rented, the net capital cost of an 8-unit factory would be about £11,000, allowing for full equipment with labour-saving devices. This sum does not include the working capital required; but the Department will give terms of credit for the purchasing of the potatoes. Payment by the Ministry of Food for the flake will be based on an estimate of cost of production prepared by the coutractor and approved by the Director of Vegetable Preservation. This estimate will assume that the factory works at full output for 40 weeks of 120 hours each, and that it requires 5½ tons of potatoes to produce 1 ton of flake. Thus arrived at, the cost price per ton of potato-flake (which for this purpose includes also the skin) will be paid for all flake and skin delivered and accepted, together with an additional sum representing the firm's profit.

This allowance for profit will be sufficient to enable the contractor, when giving full output, to obtain on the capital invested the maximum return allowed by the Inland Revenue Authorities before Excess Profits Duty is chargeable. On the determination of this contract, the contractor will be entitled to write off 75 per cent. of the original capital cost of plant and 50 per cent. of the original capital cost of buildings [illegible]ng

The Ministry will supply potatoes (at a fixed price per ton) sufficient to keep the factory producing at full output for the full working season. In the event of their failure to do so, fixed standing charges will be paid *pro rata* on the deficiency, with interest on capital at 5 per cent. per working year of 40 weeks. (*National Food Journal*, 13th November, 1918.)

Grants in Aid of Agricultural Instruction in Canada.

AN article in the *Agricultural Gazette of Canada* for September, 1918, gives an account of the Grants allotted by the Government of the Dominion to the various Provinces in respect of agricultural instruction for the year 1918-19, under the Agricultural Instruction Act. The following is a list of the Grants:—

	$	£
Ontario	336,303 26	(70,063)
Quebec	271,113 76	(56,482)
Nova Scotia	81,716 69	(17,025)
New Brunswick	64,110 80	(13,356)
Prince Edward Island	31,749 22	(6,614)
British Columbia	69,199 06	(14,417)
Manitoba	77,113 11	(16,065)
Saskatchewan	81,728 48	(17,027)
Alberta	66,965 62	(13,951)
Veterinary Colleges	20,000 00	(4,167)
Total	1,100,000 00	(£229,167)

Agreements have been entered into with all the Provinces as to the purposes to which the money is to be devoted. The work to be carried on is to be similar to that of previous years, and may be considered under two heads.

The Grant under the first head is to be directed to assistance in elementary agricultural education, including school agriculture, boys' and girls' clubs and competitions and school fairs, short courses of instruction, and aid to agricultural schools. The curriculum of the public schools, particularly of the rural schools, is gradually changing, and considerable attention is being paid to nature study and elementary agriculture, including school and home gardening.

The second main division of work is that of instruction and demonstration. The primary end in view is to bring home to those engaged in farming, by various methods, a knowledge of up-to-date agriculture, and much is being accomplished in this way. The Grant gives assistance in agricultural representatives' work, live stock, dairying, field husbandry, seed production, poultry, horticulture, insect and plant disease control, bee-keeping, drainage, demonstration farms, co-operation and marketing, demonstration trains, and to the instructional work carried on by the extension services of the respective agricultural departments.

The amount allotted to women's work is given in acknowledgment of the difficulties and disadvantages associated with domestic life on the farm and in response to the needs of farm women. In many of the Provinces the Grant supplies all the funds employed in the conduct of women's institutes, home-makers' clubs, and home economic societies. In other Provinces, such as Ontario, it provides for the holding of special classes of instruction in domestic science and the household arts.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of* 1*d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C.* 2, *and* 28, *Abingdon Street, London, S.W.* 1; 37, *Peter Street, Manchester, and* 1, *St. Andrew's Crescent, Cardiff.*

Land Drainage (Constitution of Authority) Regulations, 1919.

THE Board of Agriculture and Fisheries, in exercise of the power conferred by Section 17 of the Land Drainage Act, 1918, have made the following Regulations. They are dated 1st *January*, 1919:—

1. A drainage committee may for the purposes of the said section be constituted in accordance with these Regulations for an area consisting of such one or more administrative counties as may in each case be sanctioned by Order of the Board, and if the Order so provides the area may include one or more county boroughs.

2. A drainage committee shall consist, unless the Board by Order otherwise direct, of twelve members, of whom eight shall be appointed by the council or councils of the county or counties or county boroughs or boroughs comprised in the area, and where there is more than one appointing council the members shall be appointed by the councils acting severally or jointly and in such proportions as the Board may by Order direct. The remaining four members shall be appointed by the Board.

3. A member of a committee appointed by a council who is a member of the council at the date of his appointment shall cease to be a member of the committee on ceasing to be a member of the council. Subject as aforesaid, the term of office of a member shall be three years, unless by notice in writing to the committee he resigns his appointment or his appointment is terminated by the body which appointed him.

4. Unless an Order of the Board otherwise directs a council may appoint as a member of the committee a person who is not a member of the council, but a majority of the members of the committee shall consist of members of the appointing council or councils.

5. A member of a committee shall not take part in any decision of a committee which relates to any drainage authority of which he is a member, or relates to any land of which he is the owner or occupier or the agent of the owner or occupier, and a member shall not enter into any contract with the committee unless such contract has been approved by the Board.

6. A committee constituted in the manner prescribed by these Regulations may, with respect to the area for which it is constituted, exercise on behalf of the Board any of the powers of the Board under Part II. of the Land Drainage Act, 1918, except the power of the Board of considering and determining objections made to a draft scheme under Section 16 of the said Act and of settling any such scheme to which objection has been duly made.

(a) to enforce by means of an officer appointed by them any liability to repair which is enforceable under Section 15 of the Sewers Act, 1833; or

(b) to exercise any drainage powers which are conferred by any general or local Act, or an Order having the force of an Act of Parliament, or by an award made under any Act or by any Commission of Sewers and any power conferred by any such Act, Order, Award or Commission for defraying the expenses so incurred or for any purpose incidental to the exercise of such power.

(2) The Committee shall give or cause to be given previous notice in writing of their intention to enforce the liability, or exercise the powers, to the body or person whose liability to repair is intended to be enforced, or to any body or person empowered to exercise the drainage powers which are intended to be exercised, as the case may be.

(a) The notice prescribed by this Regulation shall—

(i.) in any case to which paragraph (a) relates, be a seven-days' notice; and

(ii.) in any case to which paragraph (b) relates, be a thirty-days' notice.

(3) A notice under this Regulation may be given to any person by leaving it for him at his last-known place of abode or by sending it through the post by a registered letter addressed to him there; or, where his name and place of abode cannot reasonably be ascertained by the committee, a notice to such person may be given by fixing a copy of the notice to any land to which the liability to be enforced attaches.

8. Any body or person to whom a notice is given under the preceding Regulation, may before the expiration of the seven or thirty days, as the case may be, appeal to the Board against the intended action by the committee and where any such appeal is made no action shall be taken by the committee for giving effect to their intention until the determination of the appeal by the Board or except in accordance with such determination.

9. The preceding Regulations relating to notice and appeal shall not apply in any case where the Board are satisfied that on account of urgency it is desirable that the committee should act without complying with such Regulations and authorise the committee to act accordingly.

10. Accounts shall be kept by a committee of their receipts and expenditure and be open to inspection by any officer of the Board, and those accounts shall be made up and audited in such manner as the Board shall direct.

11. A committee shall appoint a chairman of the committee. At any meeting at which the chairman is not present a person appointed by the meeting shall be entitled to act as chairman of the Committee. At any meeting of a committee the chairman shall, in case of an equal division of votes, have a second or casting vote.

12. The quorum proceedings and place of meeting of a committee shall be such as the committee determine.

13. The proceedings of a committee shall not be invalidated by any vacancy among its members, or by any defect in the appointment or qualification of any of its members.

14. Minutes of the proceedings of a committee shall be kept, and a minute of those proceedings signed at the same or the next ensuing meeting by a person describing himself as, or appearing to be, chairman of the meeting at which the minute is signed shall be received in evidence without further proof.

15. Any notice, direction or other instrument signed by a person describing himself as, or appearing to be, chairman of a committee, shall be received in evidence without further proof as a notice, direction or instrument issued by the committee.

16. Until the contrary is proved a committee shall be deemed to have been duly constituted.

17. A committee may, subject to any directions given by the Board, appoint such sub-committee as the committee thinks fit. A sub-committee may consist either wholly or partly of persons not being members of the committee. The acts of a sub-committee shall be subject to confirmation by the committee.

18. *These Regulations apply only to administrative counties and* county boroughs in England and Wales.

THE following Notice was issued by the Food Production Department of the Board on 13th December :—

Land Drainage: The Need for a Clear Outlet.

It is sometimes thonght that the necessity of keeping main-drainage channels clear is confined to the Fenlands or other low-lying areas, which are liable to inundation. In many places winter flooding is regarded as a normal and inevitable condition of these lands—and, indeed, it is true that certain classes of grass land derive benefit from an occasional brief flooding, if it occurs at the proper season, to provide a top dressing of river silt. But a sudden summer flood may carry away the hay or destroy valuable crops of potatoes or corn, causing heavy loss to the farmers who are affected by the catastrophe.

However, it is not only to prevent the disastrous effects of summer *floods that main-drainage is needed. Every agriculturist knows the* benefits derived from field drainage in its various forms. To quote an early writer : "While land remains in a wet state the manure laid upon it is, comparatively speaking, of little use ; the seed sown often perishes ; the crops are sickly, and later of ripening ; and the operations of harvest are attended with, perhaps, injury to the soil, uncertainty, and danger. The beneficial effects of draining on grass land are also very great. It is less liable to be poached ; rushes and other aquatic plants soon disappear ; the finer grasses rise in abundance; the pastures maintain a greater number of cattle and sheep; the stock becomes superior in quality and less subject to disease, and if the land be mown, the hay produced is much improved in quality."

The defects that Sinclair enumerates can be cured and the advantages attained by field drains that carry the subsoil water to the stream or main dyke, provided that these in their turn—and the rivers that they feed—are capable of carrying off the water. But if they are not, what is the use of the field drains ? Who will spend money on a drain that has no outlet ?

In many parts of England there are fine systems of arterial drainage, formed by the practical sense of our forefathers, which have been

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there are natural rivers; and it is no exaggeration to say that the majority of the English rivers are so clogged up by shoals, mudbanks, ingrowing trees and similar obstructions that they cannot discharge one of their main functions, that of carrying off the surplus water from agricultural land. The cleansing and thorough restoration of these main-drainage channels, natural as well as artificial, is one of the first necessities for increased production in this country.

THE following Memorandum (No. C. L. 154/L. 4), was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 6th December:—

Prisoner Labour: Migratory Gangs.

The War Office have now approved the employment of migratory gangs of Prisoners of War on threshing and other agricultural work, in accordance with the attached scheme* which takes the place of the Department's Circular (F. P. 295/L. 2†) of the 19th June last, which is cancelled. It will be observed that the financial arrangements have been slightly amended.

Committees should, therefore, make application for any additional migratory gangs they may require to the Area Commandant.

Committees will appreciate that now that British civilian labour is becoming available by reason of the closing of munition factories, aerodromes, etc., it is necessary to exercise particular care in connection with prisoner labour. Such labour must not be allowed to interfere in any way with the employment of British civilians who desire to take up or return to farm work, and Committees should dispense with prisoners in any district where available civilian labour can be placed. Every effort should be made to secure for agriculture civilians now leaving their war jobs. Committees can assist by inducing farmers to advertise their requirements in the Press and also to register them at the nearest Employment Exchange.

ENCLOSURE (F. P. 435/L. 4).

Scheme for the Employment of Prisoners of War in Migratory Gangs for Threshing and other Agricultural Work.

1. Each gang will consist of ten prisoners and two guards and will be available to meet the requirements of those districts which are not served by any existing prisoner-of-war camp.

2. The County Agricultural Executive Committee must decide whether demands for a migratory gang should be met. In this connection it should be noted that:—

(a) Migratory gangs must not be worked within 5 miles of the coast without the express sanction of the Area Commandant, or in the vicinity of an aerodrome, munition works, or any other important military or naval station.

(b) Prisoners must not be worked in a neighbourhood served by a women's agricultural camp.

3. The Committee will be responsible for selecting and securing accommodation (including a sufficient supply of good water), for each gang in a lock-up building, centrally situated and suitable for accommodating the whole of the gang. Provision must be made for heating and lighting in consultation with the Commandant of Prisoners of War

for the area. Alternatively the prisoners might be accommodated in a travelling van.

4. The Commandant of Prisoners of War for the area must be notified by the Agricultural Executive Committee of the approved applications for migratory gangs and of the arrangements made for their accommodation at least 14 days before the date on which it is desired that the men should be sent out. The Commandant must be kept informed of the location of each gang.

5. The military authorities will supply stoves, palliasses, blankets, mess-tins and cooking utensils for the gangs, the Agricultural Executive Committee arranging for the supply of straw locally.

6. No farmer or other person may give money to a prisoner of war, otherwise he will be guilty of a breach of the Defence of the Realm Regulations.

7. Rations for the prisoners and guard will be supplied by the military authorities. Rations will be delivered by the military authorities at the nearest railway station, the Committee being responsible for transport between such station and the gang. No expenses will be incurred in the conveyance of the prisoners, as they will be sent by the military authorities to the nearest railway station and must walk from the station to the accommodation arranged.

8. Each gang will be attached to a Prisoners of War Camp in the county, and the officer in charge will pay periodical visits to ensure that the work and discipline and the arrangements for food and accommodation of the gangs are satisfactory. He will at once report to superior authority any defect he cannot remedy himself. Committees must assist the officer in charge to visit the gangs by providing him with transport where necessary.

9. Threshing machine owners or farmers employing prisoners will be responsible for their safe custody from the time of starting work in the morning until their return at night. Prisoners must be handed over to the guard in the evening at such time as will permit of their reaching their quarters half-an-hour after sunset.

10. Agricultural Executive Committees must arrange for the conveyance of the rations and equipment of the prisoners and their guard to and from the nearest station, etc., as well as in connection with any intermediate movements. No doubt the threshing machine owner can assist in the case of threshing gangs.

11. The Committee's labour officer should assist with the supervision of the scheme throughout the county, working in close touch with the military authorities.

12. Payment for accommodation, fuel and lighting and any expenses incurred in the conveyance of the equipment and rations must be made by the County Agricultural Executive Committee. In the case of accommodation an appropriate rental should be arranged and in no case should charges exceed 1d. per head per night, including a sufficient supply of good water.

13. The Committee will be responsible for collecting from employers, *i.e.*, the threshing machine owner or farmer, as the case may be, payment for the services of the prisoners at the current local rate for similar work. The Committee must keep a separate account in respect of each gang, and render an account and pay over moneys to the Commandants con-

ferred

14. An account of the receipts and payments on the scheme as a whole should also be included in summary form in the quarterly accounts rendered by the Committee to the Food Production Department, the relative service account being entitled the "Prisoners (Migratory Gangs) Employment Account."

Disposal of Surplus Food Production Department Horses.

THE Food Production Department have issued a Memorandum (No. C. L. 304/M. 4), dated 7th December, 1918, in which they state that they have decided to sell by auction their in-foal mares in the various counties, and to take the opportunity of exposing at such sales those horses at present loaned to farmers under Scheme "A" F. P. 92, which the Agricultural Executive Committee may deem they can safely spare, having in view the requirements of Scheme "B" and the Prisoner of War Camps, for completing the spring work.

The Department recommend the Agricultural Executive Committee immediately to consult with the leading auctioneers, in order to fix a date for such a sale within the next month, if possible, and arrange for full advertisement. It is thought that farmers who have been using the horses may like to purchase them at the auction, and they should, therefore, be notified direct of the place and date of sale. The name, official number, etc., of the stallion mated with in-foal mares must be advertised, and will be checked by the Department's Register.

No warranty will be given for soundness, but it is important that it should be possible to describe them as fit for agricultural work. All animals will be sold by order of the Food Production Department, and as *temporarily* surplus to the requirements of the Agricultural Executive Committee.

A complete set of plough harness, including the collar in which the horse has been working, must be purchased with the horse at £2. Each set comprises bridle and plough lines, collar and hames, backband, chains, and nosebag.

The instructions in Memorandum (Ref. No. 69/L. 2) of 6th May last,* should be carefully followed.

Coal for Agricultural Purposes.

THE following Memorandum (No. C. L. 306/N. 2) was addressed to Agricultural Executive Committees by the Food Production Department of the Board in December:—

The Controller of Coal Mines has now given instructions that coal required for agricultural purposes, including market gardening, etc., is to be supplied in accordance with the scale set out in the schedule below, and the following procedure should be adopted, as from the date of this memorandum, for obtaining coal for such purposes:—

(*a*) Persons requiring coal for agricultural purposes should obtain the necessary application form (F. H. F. 9A), specimen attached,† from the Local Fuel Overseer of the Coal Mines Department, from the registered coal merchant, or from the licensed coal dealer to supply.

(*b*) When completed the application form is to be forwarded to

of coal up to the maximum allowed by the schedule. In certain cases it may be necessary to supply the coal by instalments.

(c) When any person requires coal in excess of the scale laid down in the schedule, the Local Fuel Overseer will arrange for a supply as in paragraph (b); and as regards the additional quantity will refer the application to the Agricultural Executive Committee or to the person nominated by them for the purpose of investigating and determining such claims on their behalf. A recommendation as to the additional quantity (if any) to be allowed will be made on the form and signed on behalf of the Agricultural Executive Committee; the form will then be returned to the Local Fuel Overseer for necessary action.

In investigating and recommending an application officers and members of the Agricultural Executive Committee must bear in mind that no more than the quantity barely sufficient to meet requirements can be allowed. A wasteful consumer must not be allowed to have any advantage over an economical one, whatever quantity of coal may have been consumed in previous years. In making inquiries a careful investigation must be made and absolute impartiality exercised.

Schedule showing Quantity of Coal to be allowed for Agricultural Purposes.

Purpose.	*Quantity.*	
1. Steam Cultivation	3 cwt. per acre.	
2. " threshing only	7 " per day.	An additional cwt. will be allowed for the purpose of moving the tackle to the next job.
3. " threshing and chaff cutting or baling ..	10½ " "	
4. " pumping	Full quantity required according to the circumstances of each case.	
5. Agricultural blacksmiths ..		
6. Cattle rearing and feeding ..	80 per cent. of average normal consumption.	
7. Pig rearing and feeding ..		
8. Dairy farming		
9. Cheese making		
10. Poultry keeping		
11. Other food production purposes	75 per cent. of average normal consumption, subject to a minimum of 100 tons per acre under glass.	
12. Market gardens and nurseries ...		
13. Private greenhouses and conservatories.	75 per cent. of average normal consumption, conditional upon plant being used for food production.	

The expression "average normal consumption" means "the average of the three preceding years or as many of them as are shown on the application form adjusted in respect of any change or circumstances, and of any economies already effected within the three years, and proved to the satisfaction of the Local Fuel Overseer or Local Fuel and Lighting Committee."

Price of Cereals Guaranteed for 1919.

THE Board of Agriculture and Fisheries understand that much confusion exists, among the farming community, as to the exact meaning of the announcement made by the President of the Board, in the House of Commons,* in which he agreed that the prices paid to farmers for controlled cereals harvested in 1919 will be not less than those now current.

* this *Journal*, December, 1918, p. 1124.

With a view to removing any misunderstanding that may exist, the Board now inform farmers that the price to be fixed for the 1919 crop of the cereals at present controlled will in no case be less than the prices at present in operation for the 1918 crop. In other words, the commencing prices for the 1919 crop will be at least as follows :—

	s.	d.
Rye and wheat, per qr. of 504 lb. ..	75	6
Oats per qr. of 336 lb.	47	6
Brewing barley, per qr. of 448 lb. ..	70	0
Other barley	67	0

THE following Notice was issued by the Board on 21st December :—

English Wheat for Milling.

Farmers who have recently been threshing their wheat are finding some difficulty in disposing of it to the millers.

The Board are informed that millers have already purchased home-grown wheat on an extensive scale and are consequently well stocked. The home-grown wheat in many cases has a high percentage of moisture and requires to be mixed off with dry strong wheat of which there is but a small supply in this country, so that the millers' capacity is limited.

The Royal Commission of Wheat Supplies, through the Mills Control Committee, have reduced the milling extraction of home-grown wheat as compared with the extraction of imported wheat in order to give the greater inducement to millers to purchase as much home-grown as possible, and thus minimise the present glut in the market.

The Board of Agriculture are assured that everything possible is being done to meet the situation, and therefore appeal to farmers to proceed with the threshing of oats and barley which are more urgently needed at the moment, and reserve their wheat stocks until the present congestion is relieved.

THE following Press Notice was issued by the Ministry of Food on 12th December :—

Government Control of Potatoes: Modifications in Distribution Scheme.*

The Food Controller has decided, so far as it is consistent with the undertakings given to growers, to relax the strictness of the Government control of potatoes. In order to give effect to this decision he will issue immediately an Order called the Potato (Consolidation) Order (No. 2), 1918, which will so modify the existing potato distribution scheme as to give greater freedom and latitude on sales by the growers and any dealings by wholesalers and retailers.

The following are the principal modifications :—

1. Growers will no longer require a licence to sell potatoes to retailers or consumers within their zone. The price at which they sell will, however, be the same whoever is the purchaser—that is to say, will be the grower's price fixed for the district, except that a grower may sell lots up to 1 cwt. direct to consumers at any price up to 1*d*. per lb.

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* See also this *Journal*, September, 1918, p. 706, and December, 1918, p. 1114.

2. The flat price for potatoes to retailers and consumers will be abolished and wholesale dealers and retail dealers will sell on margins in the same way as last year. The wholesale dealer's commission will be averaged over four weekly periods, the first period beginning on the 16th December. During any such period the dealer's average profits must not exceed 4*s.* per ton for sales to other wholesale dealers, and 10*s.* per ton for sales to retail dealers and consumers. The potatoes must in no case pass through the hands of more than two wholesale dealers, and any wholesale dealer who obtains potatoes through his Potato Control Committee may not re-sell them to another wholesale dealer.

3. The maximum retail price will vary with the retailer's buying price in accordance with the Schedule given below.* The buying price for the purpose of the Schedule is the sum of the two following items :—

   (*a*) The actual price paid for the potatoes by the retailer excluding any sum paid as deposit on bags.

   (*b*) Any sum borne by the retail dealer in having potatoes carted to his shop. If he carts the potatoes in his own van he may include a reasonable sum not exceeding 5*s.* per ton for this service.

4. The movement of ware potatoes from surplus to deficit zones will be controlled by the Ministry of Food as at present, but pig potatoes will be allowed to move freely from one zone to another. In the following cases, ware potatoes may be removed from one zone to another without a licence :—

   (*a*) A grower may cart his potatoes to any place in any other zone within 5 miles of his farm.

   (*b*) Potatoes grown in Essex, Middlesex, Hertfordshire and Bedford, may be sent into London unless they are loaded at railway stations in other zones.

5. Wholesale dealers in deficit zones who cannot obtain sufficient supplies of potatoes from within their own zone will indent on their Potato Control Committee or Market Committee for supplies from other zones.

These potatoes will be classified in four grades as follows :—

Grade I.—King Edwards grown on silt, warp, limestone and Highland clay.
,, II.—All other varieties grown on these lands.
,, III.—King Edwards grown on fen, skirty and sand lands.
,, IV.—All other varieties grown on these lands.

Wholesale dealers should apply to their Potato Control Committee or Markets Committee for particulars of the prices at which these potatoes will be sold and should indent on the Committee for their requirements of each grade.

At the same time it has been decided, in view of the abnormal development of blight in the Eastern Counties and other special circumstances since the date on which the growers' prices were fixed by the Joint Commission of the Ministry of Food and the Board of Agriculture, to revise the growers' prices in the counties chiefly affected as follows :—

	Prices for December for King Edward and Langworthy group. Best land (silt, warp, limestone and Highland clay). £ s. d.	Other land. £ s. d.
Lincoln	7 0 0	6 10 0
Norfolk	7 0 0	6 10 0
Cambridge and Hunts	7 0 0	6 5 0
Soke of Peterborough	7 0 0	6 10 0
Yorkshire	7 0 0	6 10 0

The prices for other varieties of potatoes will be 10s. per ton less than the above, whilst the prices for all varieties will be increased after the end of December by the amounts indicated in the Commission's report.*

The riddle for ware potatoes grown in Nottinghamshire will be reduced from 1⅝ in. to 1½ in.

THE following Press Notice was issued by the Food Controller on 14th December :—

The Seed Potatoes Order, 1918†.

This Order, which will come into operation on the 16th December, does not prescribe maximum prices to be paid to the grower, rates of commission on sales by merchants or retailers, or the size of riddle to be used in dressing potatoes for sale as or for "seed." The Order requires a written declaration to be furnished by the vendor to the buyer on the sale of potatoes as or for "seed."

The declaration must state the class and variety and dressing of the potatoes sold. In cases where seed potatoes are sold from crops immune from wart disease, they must be certified as reasonably free from rogues by the Board of Agriculture. or by the Board of Agriculture for Scotland. The declaration must also state the serial number of the relative certificate.

For the purpose of this Order the classes of potatoes sold as or for "seed" are :—

Class I. (Scotch). Class II. (once grown).
Class I. (Irish). Class III.

The "Class I (Scotch)" includes only potatoes grown in Scotland.

The "Class I. (Irish)" includes only potatoes grown in Ireland.

The "Class II. (once grown)" includes only potatoes grown in England or Wales in respect of which documentary evidence can be produced showing that they were grown in the year 1918 from seed grown in Scotland or Ireland in the year 1917.

"Class III." includes all other potatoes.

This Order does not apply to potatoes sold in Ireland for planting in Ireland.

Seed Potatoes.

DURING 1918, the Food Production Department distributed to allotment holders, small holders, and others in England and Wales, 32,000 tons of seed potatoes—13,000 tons being varieties immune from Wart Disease. In addition, 9,200 tons were shipped to the British Expeditionary Forces for planting in France or at Salonica; and 1,600 tons were supplied to the Allied Governments.

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* See this *Journal*, December, 1918, p. 1116.

† Order No. 1604, dated 6th December, 1918.

Wart Disease of Potatoes.

A SURVEY of the whole of the counties of England and Wales was undertaken lately by the Food Production Department in order to ascertain in what areas Wart Disease exists. As a result 68 districts have had to be certified as infected areas under the Wart Disease of Potatoes Order, 1918.* Among the areas so certified are a district including the county of Glamorgan and parts of the county of Monmouth, Carmarthen, and Brecon; the whole of Lancashire south of the River Ribble; and a number of parishes in the counties of Nottingham and Derby. The county of Stafford is to be declared an infected area as and from 1st January, 1920.

Mustard for Seed: Arrangements for 1919 Crop.

THE Food Production Department announce that they have had under consideration the policy to be adopted this year in regard to the growing of mustard for seed. In consequence of the action taken by Agricultural Executive Committees, the acreage in England and Wales devoted to this crop has been reduced from 51,907 acres in 1916 to 9,999 acres in 1918, with the result that a considerable additional acreage was made available for more essential food crops during the war emergency. The Department are of opinion that it is now possible to allow some relaxation of the restrictions. The crop is a profitable one to farmers and it is also important to maintain the export trade, which is of considerable value. It has been decided, therefore, that an area of 20,000 acres should be allowed for the harvest of 1919, but that half of this area should be grown on land ploughed out of grass for the purpose. Mustard for seed is a very suitable first crop to be grown on newly ploughed grass land; and it is believed that many farmers would be prepared to break up grass land if they were allowed to use the land for growing mustard for seed. The Board have made a general Order prohibiting the growth of mustard for seed except under the authority of a licence granted by Agricultural Executive Committees. This Order is dated 30th November, 1918, and is as follows:—

Order Restricting Growth of Mustard for Seed—

1. This Order is applicable to England and Wales generally.
2. Except under the authority of a licence granted by the Agricultural Executive Committee exercising powers conferred upon the Board by Regulation 2M of the Defence of the Realm Regulations in the Administrative County or County Borough in which the land is situate, land shall not be used for the cultivation of mustard for seed in the year nineteen hundred and nineteen.
3. Any occupier of a holding aggrieved by the refusal of the Committee to grant a licence under this Order may by notice in writing, given to the Committee within one calendar month from the date of the refusal, require that the question whether it is undesirable in the interest of food production that the change in cultivation required by this Order should apply to any portion of his holding, shall be referred to arbitration under and in accordance with the provisions of the Second Schedule to the Agricultural Holdings Act, 1908, except that the

arbitrator shall be nominated in default of agreement by the President of the Surveyors' Institution.

4. In the case of land situate in a County Borough within which no such Committee exercises the said powers the Board shall be substituted for the Committee for the purposes of this Order.

Removal of Restrictions Affecting Farmers.

BY an Order, No. 1667, dated 18th December, 1918, the Food Controller revokes the undermentioned Orders (among others to which reference has not previously been made in this *Journal*) to the extent specified, but so that such revocation shall be without prejudice to any proceedings in respect of any contravention thereof.

Order Revoked.	Extent to which Revoked.	Page of *Journal* in which Order was Published.
No. 376 of 1917. The Wheat, Rye and Rice (Restriction) Order, 1917.	Only to the extent to which the Orders relate to rye and to tailings, dressings and screenings of rye.	May, 1917, p. 236.
No. 1029 of 1918. Cereals (Restriction) Order, 1918.		September, 1918, p. 745.
No. 404 of 1917. Maize, Barley and Oats (Restriction) Order, 1917.	The whole, except in so far as the manufacture of glucose is prohibited.	June, 1917, p. 366.
No. 411 of 1918. The Potato (Restriction) Order, 1918.	So far as concerns the restrictions on the use of potatoes, other than sound ware potatoes, except the prohibition on use in the manufacture of spirits.	May, 1918, p. 209.
No. 1645 of 1918. The Potatoes (Consolidation) Order, No. 2, 1918.		Not printed in this *Journal*, but see p. 1233.

Horses Rationing Order: General Licence.

AN Order, No. 1639, dated 12th December, 1918, issued by the Food Controller, authorises the feeding of horses falling within the Fourth Schedule to the Horses (Rationing) No. 2 Order, 1918*, with cereal foodstuffs, at the following rates :—

Class of Horse.	*Maximum Daily Ration in terms of Oats.*
Horses, 15 hands and over	7 lb.
Horses, 14 hands and under 15 hands ..	6 ,,
Horses, under 14 hands	4 ,,

Provided that as regards such horses the records mentioned in Clause 6 of the Order are kept and are open to inspection as provided by that Clause.

For the purposes of this licence cereal foodstuffs other than oats may be used in the proportions mentioned in Clause 4 of the Order.

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* Printed in this *Journal*, November, 1918, p. 1015.

AN Order (No. 1671), dated 18th December, 1918, has been issued by the Food Controller to the following effect:—

The Cattle Feeding Stuffs (Distribution) Order, 1918: General Licence.*

Where a person who is named as a supplier in any certificate or certificates granted under this Order has supplied or has made provision for the supply of such quantities of the cattle feeding stuffs set out in the Schedule hereto as are mentioned in every such certificate, he may, without regard to the restrictions imposed by the Order, dispose in such manner as he shall think fit of the residue of such cattle feeding stuffs remaining in his hands, and such cattle feeding stuffs may be acquired by any other person accordingly.

THE SCHEDULE.

Flour Millers' Offals and Screenings.	Maize Germ Meal.
Barley Millers' Offals.	Hominy Chop.
Oatmeal Millers' Offals.	Flaked Maize.
Grist Meals.	Brewers' Grains.
Molassed Feeds.	Distillers' Grains.
	Malt Culms.

WITH reference to the manufacture and sale of compound cakes and meals, arrangements have now been made by the Ministry of Food for standardising the feeding value of these products.

Standardisation of Compound Cakes and Meals.

Makers will not be permitted to manufacture except under the terms of a licence which sets out the ingredients that may be used. The arrangements under which manufacturers of compound cakes and meals will make these products have been discussed with the Feeding Stuffs Sub-Committee of the Central Agricultural Advisory Council, who expressed themselves satisfied that the Regulations would secure the manufacture of cakes and meals of satisfactory quality. A list of the permitted ingredients is printed below.

THE SCHEDULE.

PART I.

A.—Compound Cakes or Meals shall contain:—

(1) Not more than 80 per cent. in all either alone or in mixture of any cake or meal, manufactured from any oleaginous seed, nut, or kernel, other than rape seed, linseed, or castor seed. No linseed or castor seed, cake or meal, and not more than 12½ per cent. of cake or meal shall be used in the manufacture of compound cakes or meals.

(2) Not less than 5 per cent. or more than 10 per cent. of treacle.

(3) Not less than 15 per cent., in all made up of any one or more of the articles set forth in Part II. of this Schedule.

B.—Compound Pig Meal shall contain:—

(1) 65 per cent. of palm kernel cake, or meal.

(2) 35 per cent. in all made up of one or more of the articles specified in Part II. of this Schedule other than those marked "X"

C.—*Compound Calf Meal* shall contain :—

(1) 65 per cent. linseed cake or linseed cake meal.

(2) 35 per cent. of any one or more of the following articles :—

Beans, biscuit offal, farina, ground nut cake meal, locust beans, maize and maize products, millers' offals (fine), oatmeal, peas, rye flour, sago flour, tapioca flour, wheat flour.

PART II.

Acorn meal.
Almond skins.
Apple pumice (dried).
Bakers' siftings.
Barley offal.
Beans.
Bean meal.
Beechmast kernels.
Biscuit offals.
Blood (dried).
Bone meal (green).
Chestnut (edible).
Chocolate offals.
Clover screenings.
Cocoa powder.
Cod liver oil.
Coroso nut screenings.
X Cotton seed (damaged).
Coffee meal residue.
Distillery meal (dried).
Distillery by-products.
Farina.
Fig residues.
Flour screenings.
Fruits (dried).
Flax seed.
Gluten meal.
Grain, flour, and tail corn (damaged).
Grains (brewers' and distillers' dried).
X Grass seeds.
Hops (dried).
Hops, spent (dried).
Hop meal.
Lentil bran.
Linseed screenings.
Linseed (damaged).
Locust beans.
Locust bean meal.
Macaroni.
Maize residue.
Maize meal.
Maize cake.
Makbar.
Malt dust.
Malt culms.
Manioca flour.
Meat meal.
Molascuit.
Molasstelle.
Molassine.
Oats.
Oatmeal.
Offals (millers' other than husks or shudes).
Oil foots from crude vegetable oil.
Paisley meal.
Peas.
Pea shells.
Potato residues.
Raisin residues.
Rice bran.
Rice meal (not including rice husks).
Sago flour.
Salt (not exceeding 2 per cent.).
Soda carbonate of spices.
Tares.
Tapioca root flour.
Treacle.
Trefoil ground seed.
Tomato residues.
Wheat screenings.
Wheat (kiln dried).
Yeast (dried).

THE following Notice was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food on 28th November :—

The Use of Brazilian Beans for Feeding Purposes.

A certain quantity of Brazilian beans has been recently placed on the market for use as cattle food. Complaints have been received from various quarters that these beans have

necessary to discover the origin of the complaints as to the unsuitability of the beans as cattle food.

The beans are brown in colour and about the size and shape of a small haricot bean. An analysis showed the composition to be as follows :—

Water	14 per cent.
Fat	2 ,,
Protein or flesh-former	21 ,,
Carbohydrate or starch	55 ,,
Woody fibre	4 ,,
Ash	4 ,,

There was complete absence of any poison and the analysis showed that the beans should prove of good feeding value.

The analysis having indicated its value as a wholesome cattle food, attention was directed to the feeding methods adopted, and it quickly became evident that the trouble which has arisen in the use of this bean has been due to the fact that farmers have not boiled, steeped or soaked the meal previous to feeding. Consequently, the feeding stuff has swelled after the cattle have eaten it and caused digestive trouble. It is, therefore, essential that, if used in any quantity, the bean or the meal made from it should be thoroughly soaked before use.

Provided that this is done, the meal or the bean will prove to be excellent for feeding purposes.

In the case of poultry, it has been noticed that fowls refuse to eat the bean whether crushed or not, but if boiled and mixed with the hot mash, excellent results will be obtained.

The Meat (Dealers' Restriction) Order, 1918.

AN Order (No. 1638), dated 12th December, 1918, has been made by the Food Controller to the effect that :—

(*a*) A person who deals in meat whether by wholesale or by retail shall not buy or obtain, or attempt to buy or obtain for the purposes of his business as a dealer in meat any live stock or meat unless he is the holder of a permit issued by or by the authority of the Food Controller and for the time being in force (hereinafter called a buying permit).

(*b*) Nothing in this Clause shall preclude a caterer from obtaining meat for the purposes of his catering establishment in compliance with Clause 14 of the Rationing Order, 1918.

Except as provided by (*b*) a person shall not sell or supply, or offer to sell or supply any livestock for slaughter or meat to any dealer in meat (other than the holder of a buying permit) for the purposes of his business as such dealer.

The remainder of the Order deals with permits, limitation of sales, keeping of records, offences, etc.

Increased Prices for Cattle and Sheep.

WITH reference to the Note on the increased prices for cattle and sheep which was published on p. 1025 of the issue of this *Journal* for November last, the increased prices for sheep given therein are incorrect after January, and the following figures should be sub-

SHEEP—LIVE WEIGHT.

Graded Value of Sheep (Without Skin).	Increase per Head to Farmers.							
	Feb., 1919.	Mar., 1919.	April, 1919.	May, 1919.	June, 1919.	July, 1919.	Aug., 1919.	Sept., 1919.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Under 40s. ..	2 6	3 0	4 0	5 0	4 0	2 0	—	—
,, 50s. ..	3 4	4 0	5 4	6 8	5 4	2 8	—	—
,, 60s. ..	4 2	5 0	6 8	8 4	6 8	3 4	—	—
,, 70s. ..	5 0	6 0	8 0	10 0	8 0	4 0	—	—
,, 80s. ..	5 10	7 0	9 4	11 8	9 4	4 8	—	—
,, 90s. ..	6 8	8 0	10 8	13 4	10 8	5 4	—	—
,, 100s. ..	7 6	9 0	12 0	15 0	12 0	6 0	—	—
100s. and over..	8 4	10 0	13 4	16 8	13 4	6 8	—	—

PRICES OF SHEEP PER LB. DEAD WEIGHT.

(Offals included in Sale. ½d. headage charge has been deducted.)

1919	s.	d.
February	1	3½
March	1	3½
April	1	4
May	1	4½
June	1	4
July	1	3
August	1	2
September	1	2

Further, the sentence in the last paragraph on p. 1026 " .... the above prices may (except in the case of fourth-grade cattle) be varied by 1s., 2s., or 3s." should read " .... the above prices may (except in the case of fourth-grade cattle which are sold in accordance with the Order, but, in no case at a price exceeding 55s.) be varied by 1s., 2s., or 3s."

THE following Notice was issued by the Food Production Department of the Board on 3rd January :—

Nitrate of Soda Supplies.

The Government is offering a certain amount of nitrate of soda for delivery in the early months of 1919, for agricultural purposes, at the price to farmers of £20 per ton, in bags. This price is for quantities of not less than 2 tons, delivered to purchaser's nearest railway station in Great Britain.

The minimum quantity accepted for delivery direct from Government store to purchaser's or consumer's station, according to the Food Production Department, will be not less than 2 tons; but smaller quantities may be bought from the stores of agricultural merchants or co-operative societies. In these cases, special additions to the above-mentioned price have been authorised.

Farmers who desire to purchase nitrate of soda should place their orders at once with merchants or societies, from whom full details of the Government offer can be obtained.

Notice to Goat-keepers.

THE Food Production Department announced, on 6th December, that the Ministry of Food is notifying Food Control Committees that the produce as well as the meat of goats is ration free. This statement means that any butter which may be manufactured from the milk of goats, as well as the milk itself, may be sold to anyone without the buyer being required to surrender a butter-margarine coupon.

THE following Notice was issued by the Board on 27th December :—

Agricultural Training for Service Men : Board of Agriculture Grants.*

With reference to the official announcement which appeared in the Press of the 14th December, 1918, on the subject of Higher Education and Training for those who have served in the Forces, the Board of Agriculture and Fisheries make the following announcement in connection with the training for agriculture of officers upon re-settlement in civil life.

The Board have framed a scheme under which :—

(*a*) Allowances of £125 per annum for two years may be granted to a considerable number of officers who wish to farm on their own account in this country on completion of training, so as to enable them to obtain practical agricultural experience and training with selected farmers throughout England and Wales ; and

(*b*) Scholarships of varying values up to £175 per annum and fees, for three years, may be given to a small number of officers who have had either previous experience of farming or a scientific education, or both. These scholarships will be held at an approved University or Agricultural College in England or Wales, and are intended for candidates who, on completion of their training, may wish to obtain salaried posts as agricultural organisers, teachers of agriculture, county instructors, managers, etc.

In both the above cases additional allowances may be made to officers married before the date of the Armistice, 11th November, 1918, at the rate of £24 per annum for each child up to and including the age of 15 years ; but the maximum payment under this head is limited to £96 per annum for any one officer.

These scholarships and allowances are, of course, not intended … de-

The Board propose to place in the hands of the Local Authorities throughout England and Wales the award of the allowances mentioned at (*a*) above, and the detailed administration of that part of the scheme. The necessary arrangements for this purpose are now being made.

The award of the scholarships mentioned at (*b*) above will be made on the recommendation of a Committee appointed by the President of the Board, consisting of :—

Professor T. B. Wood, C.B.E. (*Chairman*),
The Lord Bledisloe, K.B.E.,
Mr. A. B. Bruce, M.A.,
Professor C. Bryner Jones, M.Sc.,
Mr. C. Home McCall, O.B.E.,
Sir T. H. Middleton, K.B.E., C.B.,
Mr. S. Sherwood,
Mr. F. Watson,
With Mr. T. J. Young (*Secretary*).

This Committee will also advise and assist the Board generally in regard to the execution of both parts of the scheme.

A booklet (L. S. 9) is about to be issued by the Board giving particulars of the scheme and explaining, so far as is now possible, the steps that have been or will be taken to settle officers on the land after the War. This booklet will be issued before demobilisation to officers who, on Army Form Z 15 or Navy Form S 1299, state that they desire agricultural training, and it will also be obtainable after the 12th January, 1919, from the various District Directorates of the Appointments Department of the Ministry of Labour. It will contain a form of application for a training allowance or scholarship which should be completed by any officer who desires to be a candidate, and dealt with as directed in the booklet.

The term " officers " for the purpose of this scheme includes warrant officers, non-commissioned officers, and men in the ranks, provided they are of suitable educational promise.

THE following letter was addressed to County Councils and Councils of County Boroughs by the Board on 18th December :—

Land Settlement of Ex-Service Men.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to invite the immediate attention of the Small Holdings and Allotments Committee of your Council to the urgent question of the means to be adopted for enabling ex-service men to obtain land for settlement in this country.

2. As the Council are aware, the provision of land by purchase under the Small Holdings and Allotments Act has been suspended during the War owing to the fact that the Treasury were unable to allow loans

the War, and the approaching demobilisation of the Forces, it is urgently necessary that provision should be made, without delay, for those men who desire to settle on the land in this country, and the Board have therefore urged upon the Government the necessity of removing at once the restrictions on the purchase of land.

3. The necessary financial arrangements have not yet been finally settled, but the Board are in a position to say that while it is hoped that as much land as possible will be acquired for a perpetual annuity, the Government have agreed that as this method cannot be adopted on a considerable scale without further legislation, funds will be provided in the meantime enabling County Councils, subject to the approval of the Board, to purchase land for cash for the settlement of ex-service men.

4. The Government have also decided that while the Board may continue to acquire land for the establishment of colonies under the Small Holdings (Colonies) Acts if suitable opportunities offer, the County Councils, as the statutory authorities for the provision of small holdings, should be asked to undertake the main responsibility of supplying the demand for land for settlement by ex-service men. The Board feel sure that they can confidently rely on your Council to undertake this honourable and responsible duty with the utmost vigour and enthusiasm.

5. The Board recognise that prevailing financial and economic conditions render it impossible to provide and equip land as small holdings to be let at rents sufficient to recoup the whole of the capital outlay. It is clear, therefore, that there must be financial assistance from public funds on a considerable scale, and the Government have agreed to this in principle. The terms and conditions on which such assistance will be given are still under consideration, but pending their settlement the Board are anxious that no opportunities should be lost of acquiring any suitable land which can be obtained at once at reasonable prices.

6. The Board are satisfied that land should be acquired in advance of any actual ascertained demand. It is certain that the demand will be considerable, and if suitable land is acquired in suitable districts there is no danger of any lack of suitable tenants by the time it has been equipped and the holdings are ready for occupation.

7. I am directed to ask, therefore, that the Small Holdings and Allotments Committee will proceed at once to consider what land can be acquired in your County for the settlement of ex-service men, and that they will submit any proposals to the Board for their sanction.

8. As far as possible land should be secured in sufficiently large blocks to ensure the development of colonies of small holders who could be organised on co-operative lines, and in selecting land special attention should be given to the suitability of the soil, proximity to markets, transport facilities, opportunities of alternative employment and any other factors that will conduce to success. At the same time smaller areas suitable for the settlement of a few men should not be neglected.

9. In selecting land for settlement the co-operation and assistance of the Agricultural Executive Committees should be invited. Those committees are carrying out surveys of the land in their counties, and they will often be able to suggest suitable land that might be acquired for settlement. Special consideration should also be given to any farms comprising good land which is not being properly farmed, and landowners should be invited to inform the Council of a[illegible] shortly become vacant, so that as far as possible

10. Councils should not wait until offers of land are received nor should they confine themselves to land which is actually in the market. They should themselves select land in those districts which are most suitable for the establishment of successful small holdings, and should negotiate at once for the acquisition of such land.

11. It is hoped that a considerable quantity of land may be acquired by voluntary agreement, but Councils will remember that they have powers of compulsory acquisition and they should not hesitate to exercise them whenever necessary.

12. In view of the magnitude of the task it is essential that the Small Holdings and Allotments Committee should be adequately staffed. In many Counties the Small Holdings office has been closed down and the staff dispersed, and it is necessary that it should be reconstituted at once under a competent whole-time county land agent. The Board will give any assistance in their power to secure the return to their posts of any members of the small holdings staff of your Council who are serving in the Army. Expenditure on staff engaged for this work, which is approved by the Board, will be brought into account for the purpose of arriving at the amount of the contribution which the Government will make to the Councils.

13. The Board think also that Councils should make use of their power of appointing on their Small Holdings and Allotments Committee persons who are not members of the Council, in order to secure the assistance of men who are specially interested in the question of land settlement, but who may not be County Councillors. It is desirable, for instance, that every Small Holdings Committee should include at least one representative of labour.

14. With regard to the equipment and adaptation of any land acquired for settlement, I am to say that while the Board desire to impose as little departmental control as possible, it is obvious that for some time to come there must be central supervision of any building operations by local authorities. The Board will have to bear a considerable proportion of the cost and must therefore be able to satisfy themselves that all possible economies are secured in the provision of materials and fittings, while at the same time it is essential to avoid the erection of cheap cottages which would disfigure the countryside. Difficult questions connected with priority in the supply of materials will also arise, which can only be dealt with by a central authority. The Board are arranging to give County Councils all possible assistance in regard to the design and plan of suitable cottages and buildings for small holdings, and a further communication will be sent to you shortly on this subject, and also as to the arrangements which Councils will have to make with regard to architectural assistance.

I am, etc.,

(Signed) A. D. HALL, *Secretary*

THE following Notice was issued by the Food Production Department of the Board on 31st December :—

Price of Binder Twine.

Statements are appearing in the Press to the effect that the Food Production Department has fixed the price to be charged for binder twine for the 1919 harvest. This is not the

case. No price has been fixed by the Government, and a definite notice was issued in the Press early in December stating that it was not proposed to control the price of binder twine required for the 1919 harvest. Agricultural merchants and dealers should, therefore, obtain quotations from different sources in order to buy in the cheapest market.

THE following Notice was issued by the Board on 7th December :—

Redemption of Tithe Rentcharge, Corn Rents, etc.

The President of the Board of Agriculture and Fisheries desires to call attention to the fact that one of the chief objects of the recently passed Tithe Act is to facilitate and encourage the redemption of tithe-rentcharge, corn rents, etc.

The new Act provides that the amount of the consideration money payable on redemption may, under certain conditions, be agreed between the tithe-owner and the landowner, and, failing such agreement, may be determined by the Board of Agriculture and Fisheries.

According to the method of calculation prescribed by the Act for cases in which the Board determine the amount, the consideration money for redemption at the present time in an average case is approximately 18½ years' purchase of tithe rentcharge attached to a benefice, and 16¾ years' purchase of other tithe rentcharge.

Full particulars of the new procedure will be supplied on application to the Board.

THE following Memorandum (No. C. L. 104/C. 1) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 9th December :—

Wood Pigeons.

The Board desire to urge on Agricultural Executive Committees the desirability of making arrangements for a week to be set apart for the purpose of pigeon-shoots.

Last season many committees organised shoots, but their independent action was not nearly so effective as would have been the case had simultaneous shooting taken place.

In spite of the efforts made in several counties much injury was done by these birds during the present year, and the Board hope that by extended action, better organisation and co-operation, it will be possible to reduce the damage by wood pigeons next year (1919).

THE following Notice was issued by the Board on 4th January :—For 16 years the British Islands have been free from

Rabies.

Rabies (Hydrophobia or Dog Madness). It has been reintroduced in 1918 by the agency of some dog smuggled in from abroad, but it may be expected that the Regulations now enforced round the infected port and area will in time be effective in

Meantime, with the return from the various fronts of the fighting forces and of the many services both of men and of women that have accompanied them, there is grave danger of the introduction of the disease into other parts of the country if dogs are brought back. Rabies is prevalent among dogs and other animals in every country in which fighting has been going on ; it is common in France. It is one of the most horrible diseases that men or dogs can be exposed to. The danger of spreading it is greatly increased by the fact that the disease may not show itself for months after a dog has been infected by a bite. A dog owner in a country in which rabies exists may be genuinely convinced that his dog has never been exposed to infection and is in perfect health, and yet it may be a carrier of the disease. When the disease flares up the dog usually runs amok and bites a succession of other dogs before he dies, thus establishing a chain of infection that is very difficult to suppress. The Board of Agriculture enforce a detention of six months and veterinary inspection on duly registered premises on all dogs entering the country from whatever part.

Anyone now serving abroad and owning a dog there ought to consider seriously whether he or she will be justified in trying to bring it home. The detention in quarantine is under the best conditions a term of imprisonment for the dog. It is expensive for the owner, and it consumes labour and food which are badly needed in other directions. The Board of Agriculture ask all owners of dogs abroad to weigh these considerations. In the best interests both of the dogs in question and of dogs at home, and of the public safety, they are advised not to bring any dogs home with them.

Above all, the Board of Agriculture ask for the co-operation of all officers and men returning from service abroad to check the attempts to smuggle in dogs which have undoubtedly been made and have indeed resulted in rabies breaking out in Devon.

No man would willingly bring a mad dog into the country, but no man coming from a country in which rabies exists can be sure that his dog has not been infected and will not go mad.

The risk is real as the Devon outbreak shows, and the only way of preventing further outbreaks with their accompaniment of miserable deaths for many dogs and even human beings is that men and women of all ranks returning home will realise the danger attaching to dogs brought from abroad and will loyally help the authorities to secure that no dog enters the country except openly and with a proper licence.

Regulations for the Show of Thorough-bred Stallions.

THE Board desire to give notice that the Rules and Regulations for the show of thorough-bred stallions suitable for getting half-bred horses, to be held at The Park Paddocks, Newmarket, in conjunction with the Hunters' Improvement and National Light Horse Breeding Society, on 4th and 5th March, 1919, may be obtained on application at the Board's Offices, 4, The Sanctuary, Westminster, London, S.W. 1. The last day for entry to the Show is 27th January, 1919; and no stallion can be accepted for entry until it has been registered by the Board.

In the Book of Rules and Regulations will be found details as to the District Classes for England and Wales, the regulations applicable to the Show and to the Annual Registration of Stallions; and also information as to the award of the Board's premiums.

Demobilisation of Army Mares.

THE War Office are handing over to the Board a number of Army mares of light draught and hunter type for placing out with Custodians for breeding purposes. The mares will be under ten years of age and free from hereditary disease, and will be approved by representatives of the Board before being accepted as suitable for the purpose in view. The Board have asked the Agricultural Executive Committees in England and Wales to supply them with lists of suitable Custodians for the light draught mares, and the Hunters Improvement and National Light Horse Breeding Society and the Light Horse Breeding County Committees to recommend Custodians for mares of hunter type. The mares will be placed out under prescribed conditions, a summary of which is given below:—

Annual rental of £2 payable in advance.
First payment due on the day that mare is received, and on 1st April in each subsequent year.
Mare to be served annually by a stallion approved by the Board.
The Board and War Office will have a lien on the progeny when three years old at £50, and no progeny can be sold without permission until 1st October in the year in which it is three years old. Exemption can be claimed on the payment to the Board of a forfeit of £10.
The Board reserve the right of inspection of mare and progeny, and the return of the mare if the conditions are not carried out.
A Custodian may surrender a mare on giving one month's notice to the Board.

Copies of the relative conditions and of the application forms may be obtained on application to the Secretary, Board of Agriculture and Fisheries, 4, The Sanctuary, Westminster, London, S.W. 1.

Foot-and-Mouth Disease.

THE existence of foot-and-mouth disease amongst animals on premises at Littlethorpe, near Ripon, Yorkshire (West Riding), has been confirmed to-day. The usual precautions have been taken to prevent the spread of the disease, and an Order has been made prohibiting the movement of animals in a large

Orders affecting the Slaughter and Sale of Pigs.

THE Food Controller, by an Order (No. 1692), dated 19th December, 1918, has revoked the Pigs (Sales) Order, 1918.* The effect is to remove most of the restrictions on the slaughter and sale of pigs, including the obligation to sell pigs in markets.

It is also prescribed, by an Order (No. 1704), dated 20th December, 1918, entitled the Pigs (Prices) Order (No. 2), 1918, that (*a*) where a person sells for slaughter any live pig otherwise than by dead weight, the maximum price shall be at the rate of 21*s.* per score of the live weight, and (*b*) where a person sells for slaughter any live pig by dead weight or sells any dead pig, the maximum price, if the offals are included in the sale, shall be at the rate of 28*s.* per score of the dead weight, and if the offals are not included in the sale, shall be at the rate of 26*s.* 9*d.* per score of the dead weight.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for December, 1918, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Spain, United Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 250,813,000 qr. in 1918, against 211,994,000 qr. in 1917, or an increase of 18·3 per cent. *Rye.*—The estimated production in Spain, Ireland, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, and United States is placed at 18,699,000 qr. in 1918, or an increase of 31·3 per cent. compared with 1917, when it amounted to 14,245,000 qr. *Barley.*—The production in Spain, United Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, Japan, Egypt, and Tunis is estimated to amount to 71 309,000 qr. in 1918, against 64,976,000 qr. in 1917, or an increase of 9·7 per cent. *Oats.*—It is estimated that the total yield in Spain, United Kingdom Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, Japan, and Tunis amounted to 257,122,000 qr. in 1918, against 250,079,000 qr. in 1917, or an increase of 2·8 per cent. *Maize.*—The production in Spain, Italy, Switzerland, Canada, United States, and Japan is estimated at 332,840,000 qr. in 1918, against 382,094,000 qr. in 1917, or a decrease of 12·9 per cent.

In the Southern Hemisphere, the production of wheat in Australia in 1918-19 is estimated to amount to 10,100,000 qr. against 14,417,000 qr. in 1917-18, or a decrease of 29·9 per cent.

Denmark.—According to official estimates the crops of 1918 are as follows, the figures for 1917 being given in brackets:—Wheat, 799,000 (537,500) qr. (480 lb.); barley, 2,567,000 (2,144,000) qr. (400 lb.); oats, 4,376,000 (3,963,000) qr. (304 lb); rye, 1,482,000 (1,033,000) qr. (480 lb.); potatoes, 325,000 (867,000) tons (2,204 lb.). (*Broomhall's Corn Trade News*, 24th December, 1918.)

Italy.—According to the preliminary official estimate the yield of maize is given as 7,800,000 qr. against 8,780,000 qr. last year, and 10,966,000 qr., the average of the five years, 1912-16. (*The London Grain, Seed and Oil Reporter*, 11th December, 1918.)

Sweden.—According to preliminary official estimates the yields of this year's principal crops are as follows, last year's figures being given in brackets :—Wheat, 826,600 (857,700) qr. from 376,675 (326,040) acres; barley, 1,642,000 (1,175,400) qr. from 452,010 (437,190) acres; oats, 5,807,000 (7,065,000) qr. from 1,783,340 (1,931,540) acres. (*The London Grain, Seed and Oil Reporter*, 13th December, 1918.)

Malta.—According to a Consular report for 1917 the total area of land under cultivation was 42,849 acres, as against 42,687 acres in 1916-17. The yields of the principal crops are as follows, the figures for 1916-17 being given in brackets :—Wheat, 39,441 qr.; barley, 18,708 qr.; mixed corn, 5,230 qr., the total area under cereals being 20,107 (18,330) acres; beans and pulse, 4,410 (3,430) qr. from 2,742 (2,005) acres; potatoes, 14,540 (9,545) tons from 2,718 (3,190) acres; onions, 2,958 (6,054) tons from 819 (1,279) acres. (*Broomhall's Corn Trade News*, 14th December, 1918.)

Canada.—According to the official report issued by the Dominion Bureau of Statistics on 19th November, the total area planted with field potatoes in 1918 was 735,192 acres, as compared with 656,958 acres in 1917, both years establishing records. The estimated total yield for 1918 (the highest on record) is 105,579,700 bush. as against 79,892,000 bush. in 1917, being a yield per acre of 143½ bush., as against 121½ bush. in 1917, and a decennial average of 150½ bush. The total yield of turnips and other roots is estimated at 120,767,900 bush. from 343,037 acres, an average per acre of 352 bush., the figures for 1917 being 63,451,000 bush. from 218,233 acres, an average of 290¾ bush. Hay and clover give the record yield of 14,595,500 tons from 10,544,625 acres, an average per acre of 1½ tons, the corresponding figures for 1917 being 13,684,700 tons from 8,225,034 acres, or 1⅔ tons per acre. The estimated yield of fodder corn is 4,203,150 tons from 502,069 acres, an average per acre of 8½ tons. The total area under root and fodder crops, including potatoes, turnips, etc., hay and clover, alfalfa and fodder corn, amounts to 12,321,351 acres, as compared with 9,576,568 acres in 1917. The area estimated to be sown with autumn wheat for 1919 is 5 per cent. less than the revised estimate of the area sown in 1918 (886,000 acres), but 18 per cent. more than the original estimate for 1918 (711,000 acres). On 31st October the condition of the autumn wheat crop was 102 per cent. of the decennial average. About 56 per cent. of the land intended for the 1919 crops has been ploughed during the autumn, this proportion being similar to that of the last three years.

United States.—According to the final report on the crops of 1918, issued by the Bureau of Statistics of the Department of Agriculture on 11th December, the production of the principal crops and the number of acres harvested are as follows, figures for 1917 being given in brackets :—Wheat, 917,000,000 (651,000,000) bush. from 59,110,000 (45,941,000) acres; barley, 256,000,000 (209,000,000) bush. from 9,679,000 (8,835,000) acres; oats, 1,538,000,000 (1,587,000,000) bush. from 44,400,000 (43,572,000) acres; rye, 89,000,000 (60,000,000) bush. from 6,185,000 (4,102,000) acres; maize, 2,583,000,000 (3,159,000,000) bush. from 107,494,000 (119,755,000) acres; flax seed, 14,657,000 (8,473,000) bush. from 1,938,000 (1,809,000) acres. According to the report on the 1919 crops the condition of the growing winter wheat crop on 1st December is estimated at 98·5 per cent., compared with [illegible] last year; that of rye at 89·0 per cent., compared with 84·1 per

cent. a year ago. The estimated area sown with winter wheat is 49,403,000 acres, against 42,170,000 acres last year, and an average of 32,300,000 acres for the five years 1910-14; rye, 6,820,000 acres, against 6,119,000 acres last year, or more than double what it was before the War. The final official report gives the yield of winter wheat as 558,500,000 bush., and that of spring wheat as 358,500,000 bush. (*Broomhall's Corn Trade News*, 12th, 16th, 17th, and 28th December, 1918.)

Argentina.—According to the official estimate the wheat crop of 1918-19 will be about 23,500,000 qr (5,105,000 tons). The oats crop is estimated at 4,600,000 qr. (640,000 tons). (*Broomhall's Corn Trade News*, 9th January, 1919.)

Live Stock in the Netherlands.—According to the census taken in August, 1918, the number of horses in the Netherlands was 378,294 against 337,818 in September, 1917; cattle, 2,048,872, against 2,301,532 in March-April, 1917, and pigs, 600,133, against 1,185,438 in March-April, 1917. (*International Crop Report and Agricultural Statistics*, December, 1918.)

Agricultural Conditions in England and Wales on 1st January.

THE Crop Reporters of the Board, in reporting on the crops and agricultural conditions on the 1st January, refer to the wet weather that prevailed very generally during December as hindering field work more or less throughout the country. Of the area intended for wheat it is estimated that some three-fourths has already been sown. As compared with last year, the area already placed under wheat varies considerably; in the north and parts of the eastern counties, this work is much more backward, but in the midlands and west it is generally as forward as last year, or more so. On the whole, there was probably a little less actually in the ground. Sowing of winter oats and rye is also rather less, but the area of beans seems about equal to last year. The young crops are everywhere quite satisfactory, except on certain heavy and low-lying land.

Seeds are mostly reported to be a strong healthy plant in the eastern counties, but elsewhere they are more variable, promising crops being often interspersed with patchy fields.

Turnips and swedes are generally of satisfactory quality, though there are a few reports from the north-western districts to the effect that they are not always keeping well.

Ewes are generally healthy and in satisfactory condition; the earliest in Dorset are reported to be lambing well. Other live stock have maintained fair condition, considering the frequent rains. The mild weather has allowed of their being kept late on the pastures, which has helped to conserve the fodders, so that prospects of winter keep have somewhat improved during the month.

Labour is still in short supply, but a slight improvement may be noted, and several districts report that it has been sufficient for requirements. Owing to the lateness of the autumn, it is expected that the demand for labour to prepare the land for the green crops nex

The following local summaries give further details regarding agricul-
ural conditions in the different districts of England and Wales :—

Agricultural Labour in England and Wales during December.

Northumberland, Durham, Cumberland, and Westmorland.—Labour, pecially skilled, is still deficient.

Lancashire and Cheshire.—The supply of labour is still deficient, though there are signs of improvement.

Yorkshire.—Labour is still scarce, but the position has improved somewhat during the month.

Shropshire and Stafford.—The supply of labour is still short, but gradually improving.

Derby, Nottingham, Leicester, and Rutland.—The supply is still short.

Lincoln and Norfolk.—Labour is still deficient, but there are signs improvement.

Suffolk, Cambridge, and Huntingdon.—The supply of labour, though ort in a few places, is generally sufficient to meet the requirements.

Bedford, Northampton, and Warwick.—The supply of labour, though ficient in a few districts, generally appears to have improved, and to about sufficient to meet the requirements.

Buckingham, Oxford, and Berkshire.—Skilled labour is still deficient, it there is enough casual labour to keep work in hand

Worcester, Hereford, and Gloucester.—The supply of labour is im-oving, but there is still a shortage of skilled men.

Cornwall, Devon, and Somerset.—The supply of labour is still short, t there are indications of improvement is some districts.

Dorset, Wiltshire, and Hampshire.—The supply of labour is still ort, but there are indications of an improvement.

Surrey, Kent, and Sussex.—The supply of labour is still short, parti-ilarly as regards skilled men, but there are indications of improvement.

Essex Hertford, and Middlesex.—The supply of labour is still short.

North Wales.—Conditions have improved, though there is still a ck of skilled hands.

Mid-Wales.—The supply of labour is short in most districts, but the ortage does not appear to be serious.

South Wales.—Though in a few places the supply is sufficient for is season of the year, in most districts there is a deficiency.

VERAGE PRICES of **British Wheat, Barley,** and **Oats** at certain Markets during the Month of December, 1916, 1917, and 1918.

—	Wheat.			Barley.			Oats.		
	1916.	1917.	1918.	1916.	1917.	1918.	1916	1917.	1918.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
ondon ...	74 11	72 1	73 1	67 9	59 0	63 2	44 4	47 2	64 6
orwich ...	72 6	70 10	72 5	65 7	57 9	62 10	44 10	43 0	58 9
eterborough	72 8	70 9	72 1	66 3	58 7	62 4	46 2	42 4	46 1
incoln ...	73 1	70 10	72 0	66 9	58 5	62 4	46 1	43 0	56 8
oncaster ..	72 2	70 11	71 11	65 3	58 3	60 9	45 10	41 9	—
alisbury ...	73 11	70 2	71 10	66 5	58 10	62 10	44 11	41 10	51 7

AVERAGE PRICES of **British Corn** per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1916, 1917 and 1918.

Weeks ended (*in* 1918).	WHEAT.						BARLEY.						OATS.					
	1916.		1917.		1918.		1916.		1917.		1918.		1916.		1917.		1918.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 5 ...	55	8	76	0	71	2	47	8	66	4	58	0	31	5	47	1	45	5
,, 12 ...	56	7	75	8	71	2	48	6	65	7	58	2	31	11	47	2	46	9
,, 19 ...	57	2	75	8	71	3	49	6	64	9	58	1	32	6	47	4	47	9
,, 26 ...	58	0	75	10	71	1	51	0	64	5	58	7	32	11	47	8	48	2
Feb. 2 ...	58	3	75	10	71	2	52	5	64	0	58	10	32	4	47	3	50	2
,, 9 ...	57	6	76	0	72	0	52	10	63	5	59	0	32	2	46	11	50	6
,, 16 ...	56	11	76	3	72	3	53	6	63	8	58	11	31	9	47	3	52	0
,, 23 ...	58	2	76	9	72	2	54	2	63	9	58	9	32	2	47	8	52	3
Mar. 2 ...	59	4	77	4	72	2	55	7	64	0	57	9	32	4	48	0	52	0
,, 9 ...	58	2	78	0	72	3	55	6	63	7	58	5	32	3	48	7	52	2
,, 16 ...	57	9	78	10	72	4	55	4	64	1	56	10	31	10	49	4	51	0
,, 23 ...	55	11	80	3	72	3	54	6	65	6	56	9	31	4	50	4	50	3
,, 30 ...	53	6	81	5	72	4	53	8	71	10	56	7	30	5	51	10	48	10
Apl. 6 ...	51	8	84	4	72	11	53	7	69	11	56	7	30	1	55	1	49	10
,, 13 ...	53	2	85	2	73	3	53	1	71	10	56	6	30	7	57	2	47	2
,, 20 ...	55	3	84	10	73	3	52	10	70	6	56	6	31	8	59	8	47	0
,, 27 ...	56	3	81	1	73	3	53	5	69	5	56	10	32	4	58	6	46	8
May 4 ...	55	7	77	7	73	5	53	1	64	4	56	5	32	10	54	9	47	4
,, 11 ...	55	5	78	0	73	5	53	5	64	11	56	6	33	1	55	2	47	6
,, 18 ...	55	0	77	11	73	4	52	10	64	10	56	6	33	0	55	2	46	4
,, 25 ...	54	7	78	0	73	3	52	9	64	9	56	6	33	4	54	11	47	8
June 1 ...	53	3	78	0	73	8	53	9	65	11	60	0	33	3	54	11	44	9
,, 8 ...	51	2	78	0	73	11	52	8	67	7	59	2	32	7	55	0	45	5
,, 15 ...	48	10	78	2	74	3	50	9	75	6	57	9	32	1	55	1	45	7
,, 22 ...	47	6	78	1	74	4	49	10	75	0	58	5	31	3	55	2	47	8
,, 29 ...	46	3	78	3	74	4	49	1	73	11	57	10	30	10	55	1	46	4
July 6 ...	46	3	78	1	74	4	45	6	69	5	61	7	30	8	55	2	46	10
,, 13 ...	48	11	78	2	74	4	47	5	70	10	57	5	31	6	55	1	47	0
,, 20 ...	51	6	78	3	74	3	48	8	72	1	60	5	32	3	55	2	45	4
,, 27 ...	53	5	78	3	74	3	47	2	65	7	56	11	32	5	55	2	46	2
Aug. 3 ...	55	1	78	2	74	3	46	1	73	6	57	1	32	9	55	0	45	10
,, 10 ...	56	7	78	4	74	7	46	11	76	1	57	7	31	2	55	0	46	3
,, 17 ...	58	1	78	7	74	2	48	0	68	11	61	4	30	8	55	6	55	11
,, 24 ...	59	0	76	7	74	8	47	1	70	7	62	6	31	6	54	7	56	9
,, 31 ...	59	4	72	1	74	8	48	5	60	4	60	1	30	5	49	0	57	11
Sept. 7 ...	59	3	71	6	72	3	51	7	59	3	60	4	31	1	46	7	56	9
,, 14 ...	59	11	70	7	72	5	52	6	57	2	60	1	30	9	45	0	49	2
,, 21 ...	59	4	70	8	72	6	53	3	56	10	60	4	30	9	45	8	49	11
,, 28 ...	58	10	70	6	72	7	54	1	58	5	60	3	31	1	44	7	50	3
Oct. 5 ...	59	2	70	8	72	8	54	5	57	9	60	3	30	9	44	9	50	9
,, 12 ...	59	7	71	0	72	6	53	10	58	5	60	3	31	6	44	5	51	6
,, 19 ...	60	9	70	8	72	7	53	8	59	3	60	3	31	11	44	1	50	9
,, 26 ...	62	10	70	10	72	5	54	6	60	1	60	3	32	10	43	0	50	5
Nov. 2 ...	66	7	70	4	72	4	56	2	59	11	60	3	34	0	42	4	50	8
,, 9 ...	69	8	70	3	72	4	58	0	60	2	60	3	35	8	42	11	49	11
,, 16 ...	70	9	70	3	72	5	59	8	60	2	60	3	37	8	43	0	49	10
,, 23 ...	70	[illegible]	70	2	72	4	61	8	59	9	60	10	39	7	43	1	51	1
,, 30 ...	71	3	70	2	72	3	63	1	59	3	62	2	41	4	44	6	50	4
Dec. 7 ...	72	1	70	7	72	4	65	6	58	7	62	6	44	1	43	5	51	4
,, 14 ...	73	2	71	2	72	3	66	5	58	0	62	7	45	10	43	6	51	4
,, 21 ...	74	8	71	1	72	4	67	3	57	7	62	3	46	5	44	2	50	5
,, 28 ...	75	10	71	1	72	3	67	5	57	7	62	3	47	4	44	10	50	6

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats 39 lb. per Imperial Bushel.

SEPTENNIAL, QUARTERLY AND ANNUAL CORN RETURNS.

STATEMENT showing what has been, during seven years ending Christmas Day, 1918, the average price of an Imperial bushel of British wheat, barley, and oats, computed from the weekly averages of Corn Returns, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. d.	s. d.	s. d.
6 5¼	5 4	4 0

Board of Agriculture and Fisheries,
6th January, 1919. R. HENRY REW.

NOTE.—The value of £100 Tithe Rent-charge for the year 1919, as fixed by the Tithe Act, 1918, will be £109 3*s.* 11*d.*

STATEMENT *showing the average price of British corn, per quarter* (Imperial measure) for the quarter ending Christmas, 1918, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. d.	s. d.	s. d.
72 4	61 2	50 8

Board of Agriculture and Fisheries,
6th January, 1919. R. HENRY REW.

STATEMENT showing the average price of an Imperial bushel of British corn, for the year ending Christmas, 1918, pursuant to the Corn Returns Act, 1882.

Wheat.	Barley.	Oats.
s. d.	s. d.	s. d.
9 1¼	7 4¼	6 2

Board of Agriculture and Fisheries,
6th January, 1919. R. HENRY REW.

COMPARATIVE STATEMENT, for the years 1912 to 1918, of the quantities sold and the average prices per quarter (Imperial measure) of British corn as returned under the Corn Returns Act, 1882.

Year.	Quantities Sold.			Average Price.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	Qr.	Qr.	Qr.	s. d.	s. d.	s. d.
1912.. ..	2,365,396	2,165,571	630,755	34 9	30 8	21 6
1913.. ..	2,511,297	1,918,990	639,198	31 8	27 3	19 1
1914.. ..	3,027,976	2,405,072	1,164,361	34 11	27 2	20 11
1915.. ..	3,285,198	2,552,198	1,181,480	52 10	37 4	30 2
1916.. ..	5,800,391	2,182,218	1,129,096	58 5	53 6	33 5
1917.. ..	2,356,196	2,416,966	843,074	75 9	64 9	49 10
1918.. ..	2,484,210	1,870,761	446,313	72 10	59 0	49 4

[P]RICES OF AGRICULTURAL PRODUCE.

[A]VERAGE PRICES of LIVE STOCK in ENGLAND and WALES in December and November, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	December. First Grade.	December. Second Grade.	November. First Grade.	November. Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt live weight.	per cwt. live weight.
FAT STOCK :—	s. d.	s. d.	s. d.	s. d.
Cattle :—				
Polled Scots	77 1	72 6	74 10	70 3
Herefords	76 2	71 7	74 11	69 10
Shorthorns	76 8	71 7	74 9	69 10
Devons	77 0	71 8	71 9	69 9
Welsh Runts	76 2	71 7	74 10	—
Fat Cows	71 9	63 8	69 11	62 0
	First Quality. per lb.*	Second Quality per lb.*	First Quality. per lb.*	Second Quality. per lb.*
	d.	d.	d.	d.
Veal Calves	12½	11	12	11
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh...	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
	per head.	per head.	per head.	per head.
LEAN STOCK :—				
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	58 5	45 4	58 4	46 0
" —Calvers ...	50 11	40 12	50 18	40 19
Other Breeds—In Milk ...	51 17	42 18	50 10	40 5
" —Calvers ...	33 0	31 12	—	—
Calves for Rearing	3 9	2 12	3 12	2 11
Store Cattle :—				
Shorthorns—Yearlings ...	16 18	13 15	16 15	13 16
" —Two-year-olds...	26 16	22 17	26 11	22 3
" —Three-year-olds	33 17	30 8	34 1	30 9
Herefords—Two-year-olds...	27 3	24 19	29 2	25 15
Devons— "	26 12	23 3	26 17	22 16
Welsh Runts— "	25 17	22 4	25 14	21 12
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	61 4	49 0	58 4	46 9
Store Pigs :—				
8 to 12 weeks old	29 4	19 5	26 4	16 7
12 to 16 " "	60 7	44 10	54 0	38 10

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins, which during December made prices equivalent to an additional 1¼d. per lb. of the carcass weight for Downs, Cheviots and Cross-breds, 1½d. for Longwools and Cross-breds, and 1¼d. for Blackfaced and Welsh, and during November. 1½d. per lb for Downs, Cheviots and ... Cross-breds and 1d. for Blackfaced.

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in December, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	133 0	133 0	—	133 0	133 0
	2nd	133 0	133 0	—	133 0	133 0
Cow and Bull	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	199 6	116 6	112 0
Irish: Port Killed ...	1st	—	133 0	133 0	133 0	133 0
	2nd	—	133 0	125 0	133 0	127 0
Argentine Frozen—						
Hind Quarters ...	1st	148 0	148 0	148 0	148 0	148 0
Fore ,, ...	1st	118 0	118 0	118 0	118 0	118 0
American Frozen—						
Hind Quarters ...	1st	148 0	148 0	148 0	148 0	148 0
Fore ,, ...	1st	118 0	118 0	118 0	118 0	118 0
Canadian Frozen—						
Hind Quarters ...	1st	143 6	—	—	—	—
Fore ,, ...	1st	113 0	—	—	—	—
VEAL:—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	112 0	93 6	93 6	93 6	93 6
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
English	1st	140 0	140 0	—	140 0	140 0
	2nd	140 0	140 0	—	140 0	140 0
Irish: Port Killed ...	1st	—	—	140 0	—	140 0
	2nd	—	—	140 0	—	140 0
Argentine Frozen ...	1st	140 0	140 0	140 0	140 0	140 0
New Zealand ,, ...	1st	—	—	—	140 0	—
Australian ,, ...	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	—	140 0	140 0	140 0
Australian...	1st	—	—	—	—	—
Argentine...	1st	140 0	140 0	140 0	140 0	140 0
PORK:—						
British	1st	—	168 0	168 0	168 0	168 0
	2nd	—	—	—	168 0	—
Frozen	1st	—	—	—	—	—

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in December, 1918.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	27 6	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
BACON :—						
Irish (Green)* ...	189 6	—	189 6	—	189 6	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	52 11	52 3
Irish	52 3	—	—	—	53 0	52 4
American (Cold Stored)	40 0	—	40 0	—	40 0	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
British Queen ...	151 6	145 0	—	—	145 0	142 6
Arran Chief	151 6	146 6	146 6	130 0	150 0	142 6
Edward VII.	188 6	178 6	183 6	—	178 6	176 0
HAY :—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

* In the Table which was published on p. 1144 of this *Journal* for last month the price of Irish bacon (green) was inadvertently stated to be 100s. 6d. per cwt.; the correct price should be 189s. 6d. per cwt.

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1918	1917.	1918.	1917.
Anthrax :—				
Outbreaks	20	29	245	421
Animals attacked	23	33	282	480
Foot-and-Mouth Disease :—				
Outbreaks	—	—	3	—
Animals attacked	—	—	14	—
Glanders (including Farcy) :—				
Outbreaks	3	—	34	25
Animals attacked	6	10	98	63
Parasitic Mange :—				
Outbreaks	437	357	4,463	2,614
Animals attacked	881	658	8,379	4,873
Rabies :—				
Number of cases	18	—	104	—
,, ,, Dogs affected	15	—	98	—
,, ,, other animals affected	3	—	6	—
Sheep-scab :—				
Outbreaks	47	86	351	543
Swine Fever :—				
Outbreaks	107	91	1,407	2,104
Swine slaughtered as diseased or exposed to infection	36	19	562	870

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	DECEMBER.		TWELVE MONTHS ENDED DECEMBER.	
	1918.	1917.	1918.	1917.
Anthrax :—				
Outbreaks	—	—	2	3
Animals attacked	—	—	2	5
Glanders (including Farcy) :—				
Outbreaks	—	—	—	1
Animals attacked	—	—	—	1
Parasitic Mange :—				
Outbreaks	3	4	98	45
Sheep-scab :—				
Outbreaks	56	54	351	430
Swine Fever :—				
Outbreaks	8	2	36	198
Swine slaughtered as diseased or exposed to infection	9	15	138	1,142

The Weather in England during December.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 7th Dec.:								
England, N.E. ...	49.3	+9.1	0.41	10	− 7	5	0.8	−0.5
England, E.	48.8	+8.3	0.38	10	− 6	6	0.8	−0.0
Midland Counties ...	50.0	+9.9	0.57	15	− 3	5	0.7	−0.6
England, S.E. ...	50.2	+7.9	0.37	9	−15	5	0.6	−0.8
England, N.W. ...	50.2	+8.6	0.99	25	− 1	5	0.2	−0.9
England, S.W. ...	50.6	+7.0	1.00	28	− 8	6	0.5	−1.1
English Channel ...	51.8	+4.6	0.66	17	−16	6	0.7	−1.2
Week ending 14th Dec.:								
England, N.E. ...	45.7	+5.7	0.21	5	− 8	4	0.7	−0.5
England, E.	47.5	+7.2	0.69	18	+ 3	6	0.5	−0.8
Midland Counties ...	47.2	+7.3	0.62	16	− 2	7	0.7	−0.5
England, S.E. ...	49.3	+7.2	0.86	22	+ 3	6	0.4	−1.1
England, N.W. ...	47.7	+6.4	0.63	16	− 7	5	0.9	−0.0
England, S.W. ...	49.3	+6.1	1.50	38	+ 7	0	1.1	−0.3
English Channel ...	52.0	+5.2	0.86	23	− 3	5	1.1	−0.7
Week ending 21st Dec.:								
England, N.E. ...	38.7	−0.1	1.08	27	+16	5	1.7	+0.6
England, E.	41.2	+2.3	0.80	20	+11	6	1.6	+0.2
Midland Counties ...	40.7	+1.9	1.02	26	+15	6	1.5	+0.4
England, S.E. ...	43.7	+3.2	0.55	14	+ 1	6	2.0	+0.4
England, N.W. ...	41.0	+0.7	1.96	50	+33	6	0.9	−0.2
England, S.W. ...	44.6	+2.3	1.57	40	+18	6	1.7	+0.3
English Channel ...	48.4	+2.7	1.18	30	+13	6	2.1	+0.4
Week ending 28th Dec.:								
England, N.E. ...	39.1	+0.2	0.77	20	+ 9	5	1.5	+0.3
England, E.	40.3	+1.9	0.81	21	+ 9	5	1.4	+0.3
Midland Counties ...	40.7	+2.3	0.82	21	+ 6	5	1.4	+0.3
England, S.E. ...	41.9	+1.6	0.50	13	− 3	6	1.7	+0.5
England, N.W. ...	41.6	+1.5	1.68	43	+24	6	1.5	+0.6
England, S.W. ...	43.4	+1.4	1.44	37	+10	6	1.6	+0.5
English Channel ...	46.8	+1.4	1.21	31	+ 8	7	1.8	+0.1

* 1 inch = 25.4 millimetres.

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous—

Carey, A. E., and *Oliver, F. W.*—Tidal Lands: A Study of Shore Problems (284 pp.) London: Blackie and Son, 1918. 12*s.* 6*d.* net. [63.12.]

Newsham, J. C.—Farming Made Easy: a Handbook for Farmers and Smallholders. (190 pp.) London: C. A. Pearson, 1918. 3*s.* 6*d.* net. [63(022).]

Spooner, H. J.—Wealth from Waste. (316 pp.) London: G. Routledge, 1918. 7*s.* 6*d.* net. [Includes chapters on "The Coming Agricultural Revolution," "Waste Land," "Neglect of Afforestation," &c.] [63(022).]

Wolfe, Dr.—Grundsätze und Ziele neuzeitlicher Landwirtschaft. Fünfte neubearbeitete Auflage. (688 pp.) Berlin: Paul Parey, 1918. 15 marks. [63(021); 63(43).]

Macdonald, D. G., and *Grant, J.*—A Simple System of Book-keeping for Farmers and Smallholders, with Model Statement of Accounts and Balance Sheet. (72 pp.) London: W. and R. Chambers, 1918. 1*s.* 6*d.* net. [657.]

Babcock, E. B., and *Clausen, R. E.*—Genetics in Relation to Agriculture. (675 pp.). New York: McGraw-Hill Book Company. London: Hill Publishing Company, 1918. [575·1.]

Belgium, Ministère des Colonies, Direction de l'Agriculture.—L'Agriculture au Congo Belge. (80 pp.) London, n.d. [63(6).]

Bellerive, G.—Eloges de l'Agriculture: Dignite et bonheur de la vie rurale. (88 pp.) Quebec, 1915. [63(04).]

Aberystwyth, University College of Wales, Agricultural Department.—The Purchase of Seeds for 1917. (8 pp.) Aberystwyth, 1917. [63.1951.]

Field Crops—

Kirtikar, Lt.-Col, and *Basu, Major.*—Indian Medicinal Plants. (1419 pp. + 1033 plates). Bahadurganj: Pânini Office, 1918. [63.348.]

Ellis, D.—Medicinal Herbs and Poisonous Plants. (179 pp.) London: Blackie and Son, 1918 [63.348; 63.255.]

West of Scotland Agricultural College.—Bull. 83:—Report on Sugar Beet Trials, 1917. (12 pp.) Glasgow, 1918. [63.3432.]

Horticulture—

Goodrich, Helen P.—Canning and Bottling: Simple Methods of Preserving Fruit and Vegetables. (70 pp.) London: Longmans, Green, and Company, 1918. 2*s.* [664.8.]

Beckett, Mrs. E.—Fruit Bottling and Preserving. (31 pp.) London: "Country Life" Offices, 1918. 9*d.* net. [664.8.]

Seabrook, W. P.—Modern Fruit Growing. (172 pp.) London: The Lockwood Press, 1918. 4*s.* 6*d.* net. [63.41(02).]

Truffaut, G.—Production des Légumes. Organisation methodique de la Production des Légumes dans les Jardins Potagers Familiux et dans les Jardins Potagers Militaires. (260 pp.) Versailles, 1918. [63.5(08); 63.51(02).]

Migge, L.—Jedermann Selbstversorger. Eine Losung der Siedlungsfrage durch neuen Gartenbau. (46 pp.) Jena: E. Diederichs, 1918. [63.5(08).]

Plant Diseases—

Theobald, F. V.—Insect Enemies of the Allotment Holder. (59 pp.) Published by the Author, Wye, Kent, 1918. 1*s.* 6*d.* [63.27-51.]

Butler, E. J.—Fungi and Disease in Plants: An Introduction to the Diseases of Field and Plantation Crops, especially those of India and the East. (547 pp.) Calcutta: Thacker, Spink and Company, 1918. [63.24(02).]

India, Imperial Entomologist.—Report of the Proceedings of the Second Entomological Meeting held at Pusa, 5th to 12th February, 1917. (340 pp. + plates.) Calcutta, 1917. 4*s.* 6*d.* [63.27(02); 63.292(54).]

Live Stock—

Davies, C. J.—Rabbits for Fur and Flesh. (184 pp.) London: "Country Life" Offices, 1918. 6*s.* net. [63.69.]

Gouin, R.—Alimentation Rationnelle des Animaux Domestiques. (484 pp.) Paris: J. B. Baillière and Fils, 1918. 5 fr. 50. [63.604(02).]

Powell-Owen, W.—Goat-keeping on Money-making Lines. (160 pp.) London: G. Newnes, 1918. 3*s.* 6*d.* net. [63.63(*a*).]

Dairying and Food, General—

Moor, C. G., and *Partridge, W.*—Aids to the Analysis of Food and Drugs. 4th edit. (268 pp.) London: Baillière, Tindall and Cox, 1918. 3*s.* 6*d.* [543.1.]

Klein, L. A.—Principles and Practice of Milk Hygiene. (329 pp.) Philadelphia and London: J. B. Lippincott Company, 1917. 12*s.* 6*d.* net. [63.71(02); 614.32.]

Walker-Tisdale, C. W., and *Robinson, T. R.*—The Practice of Soft Cheese-making. 4th revision. (106 pp.) London: John North, "Dairy World" Office, 1918. 3*s.* net. [63.73(02).]

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Food Production in Peace.

It has lately become a trite saying that the United Kingdom has been too dependent on imported food, and that she must produce in future a far larger proportion of her essential supplies. The position we occupied before the War is emphasised by Sir Thomas Middleton in a novel manner in his Paper

IMPORTANT NOTICE.

Journal Supplement on Potatoes.

It is hoped to publish with the March issue of this *Journal* a Supplement dealing with the cultivation, composition and diseases of the potato, including a full report on the experiments in connection with Wart Disease, and the results of the spraying campaign conducted during the summer of 1918. The Snpplement will be well illustrated. Copies will be obtainable at the price of 6*d*. per copy, post free, and in view of the difficulties relative to printing and paper it is desirable that orders should be sent at the earliest possible date.

persons for a year from the produce of each 100 acres, the British farmer only 45 to 50 persons. This result was not due to Germany's yields per acre being greater than the British yields, but solely to her active plough policy.

During the War, owing to the need for increasing our home-grown food supplies, accentuated by the enemy's submarine campaign, and taking into consideration the greatly increased

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4th edit. (200 pp.) London: Baillière, Tindall and Cox, 1918. 3*s.* 6*d.* [543.1.]

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IT has lately become a trite saying that the United Kingdoı has been too dependent on imported food, and that she mu: produce in future a far larger proportio of her essential supplies. The positio we occupied before the War is emphasise by Sir Thomas Middleton in a novel mannei in his Pap read before the Agricultural Club on 14th November las he estimates (see p. 1264) that the home-grown food of tl United Kingdom before the War would have kept the who population in any one week only from 6 p.m. on Friday ti 10 a.m. on Monday. In other words, we had become produce for the week-end. Germany's policy was to grow all her foo supplies on her own soil—" under the protection of her guns "- while ours was to look to the world at large for the bulk of oı supplies, and farm at home in such a way as to secure th highest profit irrespective of the quantity of essential fooc produced.

Whereas each 100 acres of German farm land include (before the War) 21 acres of permanent grass, 11 acres of ten porary grass, 46 acres of white straw crops and 10½ acres (potatoes, each similar English area included 58 acres (permanent grass, 11 acres of temporary grass, only 19½ acre of corn crops and only 1½ acres of potatoes. In consequenc of their system, a large part of the farms being under arabl cultivation, the Germans were able to feed from 70 to 7 persons for a year from the produce of each 100 acres, th British farmer only 45 to 50 persons. This result was not du to Germany's yields per acre being greater than the Britis yields, but solely to her active plough policy.

During the War, owing to the need for increasing our hom grown food supplies, accentuated by the enemy's submarin [illegible] consideration the greatly increase

yield of human food per acre of tillage land compared with grass land, it was necessary to plough up grass land and grow corn, and to import meat. Having depended in the past too much on grass, growing insufficient winter food for stock, and relying too much on imported feeding stuffs, we are now suffering from shortage of winter keep for stock, more particularly as in the past year part of the root and temporary grass area was necessarily devoted to corn. Hence there was a glut of meat in the autumn and is likely to be a considerable shortage in the spring. In Sir Thomas Middleton's words—"We are reaping the consequences of using land for grazing that ought to be under tillage."

The plough policy cannot be legitimately criticised because in some cases crops on the newly-ploughed land have failed, since the crops have usually succeeded and "the oats and oat straw produced are worth much more to the farmer than the hay and grazing lost." "It was as obvious to the Food Production Department a year ago as to their critics to-day that there would be 'casualties' in breaking up grass land; but as it was essential that more tillage land must be secured these risks had to be faced."

The question of food production as a peace policy is considered by Sir Thomas Middleton from the point of view of the different classes of the population, and the need for State assistance for British agriculture from the standpoint of the tax-paying public. The conclusion is that the extension of the area under the plough is not only desirable, but essential to the country's welfare, to secure increased production of necessary crops for the support of the maximum number of the population, and that the public will require it in the interest of the Nation, and are likely to consent to some such guarantee as that provided for corn-growers by the Corn Production Act.

* * * * * *

Scale of Compensation for Enfranchisement of Copyholds.

A REVISED Scale of Compensation, recently issued by the Board, for guidance in the enfranchisement of copyholds of inheritance, appears on p. 1383. This scale is in substitution for that originally issued in 1888 by the Land Commissioners for England who were absorbed in the Board of Agriculture when it was constituted in 1889.

The effect of the revision is to reduce considerably the

annual manorial payments. Although intended primarily for guidance in compulsory enfranchisement under the Copyhold Act, 1894, it is understood that the Scale is used largely in enfranchisements at Common Law. It is also in practice used for valuations of copyhold lands for various purposes other than enfranchisement.

* * * * * *

Value of Cottages as Part Payment of Agricultural Wages.

IN accordance with their powers under the Corn Production Act, the Agricultural Wages Board in September last fixed the maximum value at which the provision to an agricultural worker by his employer of a cottage free from defects of accommodation, or sanitation, or water supply, and not in want of repair, might be reckoned as part payment of minimum rates of wages in lieu of payment in cash, as 3*s.* per week. Under the Order of the Agricultural Wages Board, however, District Wages Committees were empowered to determine the maximum value in their areas as less than this sum. The only District Committees which have considered it necessary to make any determination in this respect are those for Buckinghamshire, Herefordshire, Northamptonshire and Somerset. The Wages Board have approved the determinations for these counties, and the maximum value of cottages in the areas in question has been fixed as follows :—

Herefordshire and Northamptonshire (including the Soke of Peterborough)—2*s.* 6*d.* per week.

North Buckinghamshire (Rural Districts of Newport Pagnell, Stratford, and Wolverton, Buckingham and Winslow)—2*s.* per week.

Mid-Buckinghamshire (Rural Districts of Wing, Aylesbury, and Long Crendon)—2*s.* 6*d.* per week.

Somerset (Rural Districts of Williton, Dulverton, Wellington, Long Ashton, Axbridge, Langport, Yeovil, Keynsham, Shepton Mallet, Wells, Wincanton and Frome)—2*s.* 6*d.* per week.

In the remaining parts of Buckinghamshire and Somerset, and in all other counties of England and Wales, the maximum value for the purpose in question continues to be 3*s.*

In this connection it should be pointed out that if the worker considers that a cottage for the provision of which a deduction is made from his wages is defective in accommodation, sanitation, or water supply, or is in need of repair, he may ask the District Wages Committee for his area to fix the sum which may be deducted at less than the maximum sums mentioned above.

FOOD PRODUCTION IN WAR AND PEACE.

THE following Paper was read by Sir Thomas Middleton, K.B.E., C.B., at a meeting of the Agricultural Club on Thursday, 14th November, 1918 :—

FOOD PRODUCTION AS A WAR POLICY.

Food production is not the same thing as agriculture ; thus the policy underlying the food-production movement may not correspond with the policy that should govern ordinary farming activities as carried on before the War.

If I may adapt language much used in another connection, it can be said that before the War the attention of agriculturists was concentrated on an effort to survive. They had come through a 40-years' struggle for existence, and it is not surprising that the farmer's one test of successful farming was the bank book, and that the landlord's golden rule of good husbandry which overshadowed the binding rules of the Victorian era was " Be punctual on rent day and pay in full." That type of farming was best which produced a sufficient return on the capital invested with the least risk and trouble to the farmer himself and to his landlord. The British people looked to the world for its food and to the Navy for the certainty of its supply (and be it remarked, in spite of all that has happened, there was foundation for the confidence). The land of Britain itself was, as it were, but the home farm, a convenient source of milk and vegetables, of good meat for week-ends and holidays, but otherwise of no great account as a contributor to the stability of the estate. My week-end metaphor is more than a figure of speech. I estimate that the food grown in the United Kingdom before the War would have kept the whole population from 6 p.m. on Friday till 10.0 a.m. on Monday.

Comparison of British and German Methods.—Our principal enemy in this War took quite a different view of the functions of the agriculturist. There was, as in this country, much controversy as to the merits of rival policies. The policy which prevailed was thus stated by German economists :—Germany must " keep under the protection of her guns the ground upon which her corn grows and her cattle graze." Translated into of

off, one guiding principle in her strategy has been to occupy the most productive territory within reach.

As an illustration of the effects on a national scale of an agricultural and a food-production policy, we may, therefore, contrast the systems of Britain and Germany. I may do so conveniently by referring to some figures from a pamphlet I wrote on German Agriculture in 1916.

On each 100 acres of cultivated land* before the War—

(1) The British farmer fed from 45 to 50 persons, the German farmer fed from 70 to 75 persons.†

(2) The British farmer grew 15 tons of corn, the German farmer grew 33 tons.

(3) The British farmer grew 11 tons of potatoes, the German farmer grew 55 tons.

(4) The British farmer produced 4 tons of meat, the German farmer produced 4¼ tons.

(5) The British farmer produced 17½ tons of milk, the German farmer produced 28 tons.

(6) The British farmer produced a negligible quantity of sugar, the German farmer produced 2⅗ tons.

The reason why Germany produced so much more food was not that the yield per acre of her crops was greater—they were in most cases less—but that while most of the land of Britain is under grass, most of the land of Germany is nnder the plough.

The figures below (see the table over-page) contrast the cropping of the cultivated land of England and Wales and of Germany before the War.

What were the outstanding features of the English and German farms? On each 100 acres of land it will be seen that whereas the Englishman had 58 acres, the German had only 21 acres of permanent grass; adding temporary to permanent grass the Englishman had 69 against the German's 32 acres. On the other hand, when we come to white straw crops, the Englishman had 19½ acres of corn on his 100-acre farm, the German 46, and while the Englishman grew 1½ acres of potatoes the German grew 10½. But the real significance of these figures cannot be appreciated until we answer this fnrther question—

* Cultivated land includes arable and grass land, but excludes the "Mountain and Heath Land used for Grazing" of Britain and the corresponding "Geringere Weiden und Hütungen" (poor pastures) of Germany.

† These figures are based on the estimate that, of the total "energy value" of food consumed, Great Britain imports on the average about 60 per cent., and that Germany imports 10 per cent.

'hat is the value of the crops grown? Now here we must .stinguish between the money value and the food value. ur customary method is to value in terms of pounds, shillings id pence the yield per acre of land, but we cannot live upon

Cropping of Cultivated Land in England and Wales and in Germany.

Crop.	England and Wales. Average of 1905-14.	Germany, 1913.
	Per cent.	Per cent.
Permanent grass for hay	17·55	18·00
,, ,, ,, pasture ..	40·83	3·23
Rotation grasses and clovers—		
Hay	6·40	7·57
Pasture	3·68	
Green fodders, vetches, maize, etc.	·58	3·39
Total grasses, clovers, etc. ..	69·04	32·19
Cereal crops	19·50	45·97
Beans and peas	1·66	1·58
Potatoes	1·59	10·44
Root crops, cabbages, and rape ..	6·24	4·66
Gardens, fruit, and vineyards ..	·44	2·51
Miscellaneous Crops	·37	·35
Fallow	1·16	2·30
Total	100·00	100·00

sh, and for nations compelled to feed themselves, as the rmans have been for the past four years and as we might have *en if Germany had only built a larger fleet of submarines* fore she declared war, the value must be assessed in some ier way. Let us inquire, therefore, how many persons) acres of land will feed for a year if put under different ops.

Relative Values of Pasture and Arable Cultivation.—First, as gards grass. We have in this country grass of varying ality, from the hill pasture producing 2 or 3 lb. of mutton per num to the rich grazing pasture on which a bullock may put 3–4 cwt. of live-weight per acre in the season. If we take ry poor lowland pastures worth from 2*s.* 6*d.* to 5*s.* per acre grazing, it will be found that they yield about 20 lb. of lean at per annum; a medium pasture, rented at from 15*s.* to *s.* according to the district, may be expected to produce out 100 lb. of meat, while a first-rate fattening pasture, ited at from 30*s.* to 40*s.*, may produce as much as 200 lb. per re per annum. If we take the produce of 100 acres of land

of each description and assume that the meat produced is used skilfully in combination with other foods, and if by this method we calculate the total number of persons who could be supported on the produce of 100 acres for one year, we get the following figures :—

From the poor pasture	.. .. ..	2—3 persons.
,, medium pasture	.. .. ..	14—16 ,,
,, rich pasture	.. .. ..	25—40 ,,

Now how do these figures compare with the produce of tillage land? Let us assume that we have 100 acres growing an average crop of wheat, that the tailings and damaged grain are used in cattle-feeding, and that the balance of the crop after providing seed amounts to about 29 bush. per acre. The produce of 100 acres of this wheat, if milled to 80 per cent. would yield food for 230 persons for a year, and if the milling were reduced to about the pre-war standard it would provide food for 200.

Making similar estimates for average crops of barley and oats, we should find that they provide food for from 160-180 persons per 100 acres.

Potatoes, which, by themselves, would be quite an unsuitable food, but which, in combination with a limited amount of grain and meat, are quite capable of maintaining a population in perfect health, are even more valuable from the standpoint of maintenance of a large population than the cereals. An ordinary 6-ton crop, after allowing 15 cwt. for seed and 10 per cent. for waste, should provide enough to feed 400 persons per 100 acres of land. We may next compare with these figures the value, as human food, of such crops as mangolds and meadow hay. These cannot be used direct but must be employed in producing meat or milk. Assuming that they are used in meat production, a 20-ton mangold crop would produce food for 40 persons per 100 acres and a 30-cwt. crop of meadow hay would similarly provide for 14 persons. It *will thus be seen that there is a wide range in value between* our different farm crops when value is estimated in terms of production of human food.

It is not practicable, or at least under ordinary farming conditions it would not be practicable, to grow cereals and potatoes continuously. The crops of our tillage land are arranged in rotations which vary from district to district. I have estimated that if we averaged the rotations practised in the United Kingdom before the War and used the tillage crops partly for human food, partly for stock-feeding, as was

then our custom, the produce of the ploughed land of the country maintained about 84 persons per 100 acres. Similarly, I have estimated that before the War the grass land of the United Kingdom, which was partly used for milk production, partly for meat production, partly for other purposes, such as the maintenance of horses and the growing of hay, was providing food for about 20 persons per 100 acres per annum. In time of war, therefore, when the production of human food is the prime object of the nation, there can be no controversy as to the relative values of tillage and grass land.

Production of Meat as Compared with Wheat.—But in time of war it is not enough to consider the relative number of men who can be fed on a given area of land. We must also have regard to the shipping required for provisions.

At first sight it would seem that it would be better for us to import wheat than meat, for roughly 2 tons of wheat can be shipped for 1 ton of meat; the first occupies about 50 cubic ft. of shipping space and the second about 100 cubic ft. But we must not stop short with this simple calculation. Clearly, when attempting to estimate whether a nation short of tonnage should attempt to produce wheat or meat we must think in terms of acres as well as in terms of ships.

Let us take a very simple case. Suppose that the population of an island wholly under grass, after providing for their milk supply had 80,000 acres of grazing left for meat production, and that the land was of a quality that produced 1 cwt. of meat per acre per annum, then the total supply of meat would be 4,000 tons. To hold this amount of meat a 10,000-ton steamer would be required. Further, assume that each year the island has to charter a *10,000-ton steamer* to bring in its wheat, a ship of this size would carry 8,000 tons of wheat, roughly the quantity that could be grown on 10,000 acres of land. It is clear, therefore, that if tonnage were scarce it would be possible for the island to effect a very large saving by substituting wheat for meat. If it were practicable to break up 10,000 acres and to produce average crops of wheat within a year, seven-eighths of the tonnage could be released for other purposes.

This tonnage consideration was one of the main reasons for breaking up grass land in 1918. It was known that ships would be very scarce, and it was obviously desirable to substitute for grass some crop which would reduce the tonnage demands of the country.

The respective effects of grazing and tillage on the permanent demand for tonnage cannot, of course, be determined by the

simple process of estimating how much wheat and how much meat given areas would produce. Wheat is not grown continuously even in time of war, and assuming the islanders in our illustration wished to produce wheat for a considerable period of time they must plough at least 20,000 acres of land, and most probably provide shipping space for implements and manures; but it would be safe to conclude that if suitable land for wheat-growing were available, the results of substituting tillage for grazing would be to release in time of need 4 ships out of every 5 required for carrying wheat.

Feeding of Live Stock.—There is a further aspect of grazing and tillage farming which is of special interest and importance at the present time, viz., the effects of grazing and tillage on live stock.

There is no branch of British farming so important to the farmer himself as the breeding and rearing of live stock.

Even on arable farms cattle and sheep breeding and feeding are often more profitable than the cultivation of any tillage crop, and the main interest of many of our arable farmers is centred upon live stock. No arable farmer will dispute the fact that grass is the natural food of stock and that stock raising on grass is usually not only an easier and safer business for the farmer, but better for animals themselves than stock raising on tillage crops. Thus in most parts of the country, even where the soil is well suited for tillage, every farm has 40 to 50 per cent. of the land in grass (the chief exceptions are on the chalk). The result is that we do not grow enough *winter food for our live stock.*

Before the War we were using over 4,000,000 tons of feeding-stuffs in the production of meat; by far the greater part of these feeding-stuffs consisted of the by-products of the flour or oil mill, but a very substantial amount of grain was imported for meat production. The use of the by-products of home industries in stock-feeding is wholly desirable; but the unfortunate effect of their abundance before the War was to lead farmers to depend too largely on imported feeding-stuffs instead of on the products of their own land. We are now suffering the consequences. We have an abundance of summer keep to maintain our flocks and herds and we have roots or straw for winter use, but we are cut off from the feeding-stuffs so necessary for winter fattening, and our live-stock industry may suffer severely before supplies are again available.

Not only so, but whereas we have plenty of cattle and sheep

is a glut of meat at the end of the grass season and there will be a shortage in the spring. We are reaping the consequences of using land for grazing that ought to be under tillage.

In this particular year (1918), because of the threatening position of cereals in 1917, we have even sacrificed a part of the limited area of arable land devoted to keeping stock. Our root crops and much of our temporary grass have given place to corn so that, partly from the reduced area and partly from an unfavourable season, supplies of these natural winter foods of our live stock are very limited in many counties.

Some critics of the Food Production Movement ascribe the present difficult position of live stock to the ploughing out of grass last season. Where the crops on newly-ploughed land have succeeded, as they usually have, the oats and oat straw together are worth much more to the farmer than the hay or grazing lost; where crops have failed, there is, of course, a total loss; but we cannot legitimately criticise the policy of ploughing up grass land on this account. The real fact was that war found us with a system of farming well enough adapted to the conditions of 1913, but wholly unsuitable for the period of struggle on which we embarked in 1914. We continued our system for two years trusting to luck to end the War and to the Admiralty to check submarines. When, at the end of 1916, it was realised that the War would go on, that the American cereal crop was poor, and that the submarine was increasing its toll on our ships, we decided to change our methods. It was as obvious to the Food Production Department a year ago as to their critics to-day that there would be "casualties" in breaking up grass land; but as it was essential that more tillage land must be secured these risks had to be faced.

So long as war conditions continued it was necessary to go on increasing our tillage land as rapidly as the labour at disposal enabled us to make the change. In the autumn of 1918 our own food supply was in a much less precarious state than at the beginning of this year; but had the Armistice not been signed last Monday our herds and flocks would have been in even a worse position during the next six months than they were in before America entered the War; for whereas we could represent to the United States that our own bread was more essential than their soldiers, we could not claim that it would be in the interest of the Allied Nations that American troops should be held up and the War prolonged in order that we might avoid killing off our sheep and cattle.

FOOD PRODUCTION AS A PEACE POLICY.

Considerations likely to affect future Farming Methods. — But the combatant nations have had their fill of war, and now what is the agricultural policy of Britain to be? Is it to be in favour of a cheap food supply regardless of security, or a safe food supply regardless of cost? Are we to continue British farming as a "week-end" adventure, or are over 46,000,000 acres to be required to do more for our 46,000,000 people? Shall we adopt the system of farming that with least risk is likely to be the most profitable to the small percentage of our population now living on the returns from the land; or shall we endeavour to exploit the resources of our soils for the purpose of providing employment for more of our people?

He would be a bold man who at this stage would attempt to prophesy.

Let us merely catalogue the voices that will shout loudly in the Great Palaver that will follow the signature of the Peace Treaty:—

1. There is our own. Agriculturists will undoubtedly make themselves heard; theirs will not be the loudest shout, and their cries, unless they are backed up by other sections of the nation, will not carry far, for relatively they are few in number. It follows that if the agriculturists' cry is to gain attention it must be as attractive to others as to themselves. It must be reasoned and reasonable, it must admit that agriculturists are in a minority and that their own demands must be proved to be advantageous to their fellows.

2. There will be the food-consumers' shout—the greatest of all, for all of us are consumers; but to the wealthier classes the cost of food is a secondary affair, and the consumer's shout will be a crescendo growing louder as the earnings of the consumer fall; loudest of all, therefore, from those who represent the poorest among us.

The satisfying of this cry will raise questions of extraordinary difficulty, and the agriculturist will be well advised to give it not only close but sympathetic consideration. He should, indeed, start with the study of his own programme from the standpoint of the poorest of the consumers.

3. 4. Next there will be the demands of the Free Traders and Tariff Reformers. I am on dangerous ground in attempting to express an opinion on sacrosanct subjects; but it appears to me that Free Traders are generally right

in principle and often wrong in practice; while Tariff Reformers are generally wrong in principle, but often right in practice. Free Trade is a perfect principle for a perfect world; but, inasmuch as the nations of the world are not yet perfect, and as the traders of these nations are not, in matters affecting public weal, superior in their honesty and disinterested devotion to the mass of the inhabitants whom they represent, Free Trade is not yet fit for acceptance as a World Trade Principle. At the same time, even those who have liked it least, the agriculturists of Britain, should admit that it served Britain magnificently in the Victorian era; and those of our industrialists who profited by it most should equally be prepared to admit that Protection served the policy of the German nation magnificently in the 20 years before the War. Let us, therefore, reserve our views on Free Trade and Protection as questions of principle, so that the special needs of particular industries may be approached without economic bias when their development is under consideration.

5. There will be a party who will claim that the "Peace of Versailles" will be the last Peace Treaty, that wars have ceased, and that henceforward the nations of the world will have no need for defence. A League of Nations would greatly lessen the danger of wars; but I hope you will not think me cynical if I express the belief that any great nation which neglects the means of defence will soon cease to be great in the world's councils. Religion and education have failed to prevent war. Is there any prospect that the rulers of mankind in the Twenty-first Century will be better men than were, say, the rulers of the Nineteenth Century? Who among us 25 years ago would have believed it possible that another Attila would spring up? The Hohenzollerns have gone, but even if the most ample safeguards are taken to prevent the future emergence of a Hohenzollern, who is there to gnarantee the permanent suppression of Lenins and Trotskys? Meantime be it noted that Hindenburg is recrossing the Rhine "with head erect."

6. A more popular view, if I mistake not, will be that of the representatives of the Blue Water School. Britain must be secure, Britain must be defended. Her shield is her Navy, her future, like her past, will be

vy in the

present War, the no less magnificent work of our merchant service, compel our gratitude; may this not compel our reason?

What of the submarine of the future? Can we be certain that as the Navy has suppressed it, and as our merchantmen have defied it during the past four years, they would do so again? I know no more about submarines or about the devices for their destruction than do, say, 9 out of every 10 voters who will elect the first peace Parliament—in other words nothing at all beyond what I can infer from the history of the past four years—but this is how the position appeals to me: Naval construction will concentrate on the improvement of the submarine and on the development of devices for destroying it. In both there are certain to be improvements in the next generation, as there have been in the battleship, the locomotive, and the telegraph system of the past century. It is possible that the means of destruction will so far outpace the improvements of the submarine that the latter will disappear; but to the outsider it would seem that the odds are in favour of the submarine. Admiral Sims told us the other day that Germany has recently only been able to keep 8 to 9 submarines on the Atlantic at one time. The German newspapers have, within the past few weeks, bitterly reproached their naval authorities for neglecting submarine building, and have stated that at times three only were available for use on the western side of Britain.

The submarine is a small vessel, and I should suppose that a number could be made at the cost of one Dreadnought. Is is not likely that in any future naval war many will be available at the outset, and even if there are no Emdens or Moewes on the high seas a very heavy toll of shipping would be taken before the seas could be cleared.

The huge strength of the Allied fleets, the convoy system, and the very small number of effective submarines, have enabled us to struggle through this War; but nnless submarine building is debarred by peace treaties and enforced by a group of powerful nations, it seems to me that Britain could only neglect the submarine menace at the risk of abandoning her position as a Great Power.

I have said enough to indicate the types of question that will occupy public attention so soon as the urgent problems of war cease to monopolise the thoughts of the public. Let us, therefore, return to a consideration of our own affair—the position of agriculture and the policy of food production as

distinguished from the pre-war policy which guided the methods of landowners and farmers.

Assistance to British Agriculture.—What is likely to happen? When the period covered by the Corn Production Act ends in 1922, will agriculture be treated as it was before the War or will the principle of the Corn Production Act be continued?

I think you will agree with me that in view of the great change that has been made in our electorate and the numerous issues that will be raised in our first Peace Parliament, a mere statement of opinion would not be very fruitful. Instead, let us discuss the effects of alternative policies. And first, the effects of a return to the policy of the past.

During the War we have gained something. There is no doubt that our farmers are more alert than before, that they are more ready to adapt their methods to new conditions, and that many of them will continue new practices begun during the War. We have, moreover, a much greater area under the plough. Tillage crops, other than temporary grass, now occupy 15½ million acres in the United Kingdom as compared with just under 13 million acres before the War. For a time, too, prices of corn are likely to be considerably higher than before the War. For what length of time after 1922 these higher prices may continue will depend chiefly on the world's harvests. It is indeed possible that for a long time to come prices will not fall to the 1900–1914 level, since the value of money may take a long time to recover; but when measured in terms of the value of other commodities, it is probable that at no very distant time, say within 10 years, we would be likely to have very low corn values as the result of good world harvests.

While it is improbable that the value of the farmer's products would long remain above the pre-war values, it is certain that his expenses will increase, notably the price of labour. Wages have nearly doubled, and while it may be admitted that this will not double the cost of labour, I think it is certain that the cost of labour in the future will be much higher than before the War.

Even with higher wages the labourer's position is not satisfactory—the need for better cottages is pressing; these must be provided in numbers if the land is to be tilled. Will the profits of agriculture bear the burden? Even if the labourer's wage stands at the present level could he afford to pay an economic rent? For cottages built within the next 5 years I should suppose that the economic rent would be nearer 6s. than 3s. per week.

What then would be the farmer's position if we go back to our old agricultural policy?

Some years before the War I asked a prominent northern farmer how things were going with him. "Farming was never so exciting" was his reply. "How so?" said I, knowing that he farmed in a secluded and peaceful valley. "Trying to make the rent" was the quick reply; and I daresay that if we look back on the past 20 years or so we will agree that, on my friend's view of the case, farming was an exciting business for most tenants. The question that arises here is—Can farmers as a class afford to farm in any other way than they did in the pre-war period? Must their attention be concentrated narrowly on rent day, or can they afford to alter their methods in the direction of producing more food from the soil? While I believe that the end of the War will find the capital at the disposal of most farmers much increased, my personal view is that if the pre-war policy of leaving the farmer to face world competition is continued, he will soon return to the exciting pastime of rent-finding.

And the landowner and manager of estates. What is their problem? I suspect that before the War many estate agents had quite as exciting a time in finding the wherewithal to meet death duties and public or private burdens on land as farmers had in finding rent, and the War has certainly not improved their position.

The conditions during this War have been fundamentally different in their bearing on land from those that ruled during the wars of the Eighteenth and early Nineteenth Centuries. Then wages were low and labourers suffered acutely; rents were very high, and though after Waterloo corn prices were relatively greater than at any time during the present War farmers lost money and many became bankrupt. Nominally, landlords grew rich on the great rents they received. In fact, most of them did not grow rich, the money saved was invested in permanent improvements on their estates, and the capital thus sunk by them resulted in a sufficient food supply being provided during many years for the rapidly-growing industrial population of this country.

Harsh things were done by some landlords in connection especially with the enclosure of land; harsh things have been said of all of them since; but the care which landowners gave to the improvement of their estates, and the extent to which they invested the proceeds of land in the improvement of

successful prosecution of our Napoleonic Wars, but the growth and prosperity of industrial England.

During the present War, while rents have not gone up, public burdens have greatly increased and interest on mortgages has risen sharply. Landowners will be in a very different financial position from that in which they found themselves a century ago. Occupying owners have, perhaps, increased their capital; but the total volume of this increase is insignificant, and unless there is a great transference of land to men who have made profits in other industries, it is difficult to see where the private capital necessary for the improvement of land is to come from.

On the other hand it is clear that the condition of much of our land after the War will demand a substantial investment of capital in buildings, drainage, liming, fencing and those other permanent improvements which the owner is expected to provide.

I would like to sum up the foregoing discussion by predicting that the lessons which the farmer has learned from the War and the money he has saved would, in themselves, result in a permanent increase in the tillage area of the country; but I am forced to the contrary conclusion. If we adopt the pre-war policy; if the nation tells the farmer that his corn crops are immaterial to its welfare and that it will look to its ships, not to its ploughs, to provide a secure bread supply, the land recently ploughed up will rapidly revert to grass and the conversion of old arable land to pasture will proceed even more rapidly after 1922 than it did in the period before the War.

Now, as to the prospects of an alternative policy. Is it likely that the taxpayers of Britain, burdened as they will be for many years to come, will consent to continue any such guarantee as that provided for corn-growers by the Corn Production Act? My personal opinion for what it is worth is that they will, and I am glad that in support of this view I can cite statements of more value than my own opinion.

The Prime Minister, speaking at Manchester on 12th September, made use of these phrases, "Comfort is the surest preventive of anarchy, but comfort involves plenty. You can ensure plenty by ensuring the best conditions for production. . . . We have been dependent on others, not because Great Britain cannot produce food, but because we never realised the importance of home production. . . . It is in the highest interests of the community that the land in this country should be cultivated to its fullest capacity. . . . The cultivation of the land is the basis of national strength and prosperity."

The views expressed by Mr. Lloyd George are likely to prevail widely, after the War, among the industrial classes of Britain, whose experience of a bare breakfast-table in the past two years has discounted the benefits of the free breakfast-table of which we heard so much in the past. Whether this first conclusion from war experience is strengthened, or passes away, will depend not a little on the action of agriculturists themselves.

At best this new belief in the value of home agriculture must be but a tender plant for a generation; during this period every farmer who adopts a selfish and narrow policy, who refuses to make the most of the land at his disposal, who neglects to bring the "comfort" to his town neighbours which the Prime Minister promises them, will be a traitor to the welfare of British farming. The townman asks for good, wholesome farm produce and plenty of it; it is our task to see that he gets it.

Settlement on the Land.—But there is a second consideration that will tell powerfully in favour of tillage farming. There has been a great accession to the ranks of the workers of Britain during the War, chiefly through the influx of women. The men will come back; the women, or many of them, will not go. The demand for profitable employment will be great. Our industries will not soon recover from the shock of war. Some of them may not regain their former size in our time, if ever. Take the luxury trades, which throve while nations were rich; what is to become of them while Europe is paying its debts? After the War, money will not circulate as it has done in the past, and our expenditure will be mainly on commodities which are essential to us.

Now what is Britain going to do with these superfluous workers? "Send them to her colonies" is perhaps the solution that most of us would suggest, for in the colonies there is room. But could we, as a nation, order our young men who have fought for Britain, and our young women who have toiled for Britain, to leave the land of their fathers against their wishes and commit the care of the land itself to herdsmen and shepherds? This is sentiment, you will say, not business. I am not prepared to agree; agriculture is the most essential of our industries; land, to borrow the language of the economist, is a prime instrument of production, and, in the circumstances in which the able-bodied men and women of Britain are likely soon to find themselves, land must be put to its fullest uses.

The land of Britain is well suited for cultivation; in most parts the climate is as favourable for mixed farming as that

in any European country. The weather can be bad, we know to our cost, but we need not take fright because of our recent experiences. Ninety years ago, after the first effects of the Napoleonic wars had disappeared, although farmers were without artificial manures, without pipe drainage, and almost without machinery, Britain fed a larger population than to-day. If the advantages which we enjoy in the early Twentieth Century were yoked to the energy of our forefathers we might be almost or quite self-supporting in spite of our climate. It is not the case that Britain cannot grow corn, and while it may be admitted that many parts of Britain produce very fine pasture, we must guard against the assumption, too readily made by agriculturists, that land which produces fine pasture should not be tilled.

Agriculture as a National Asset.—There is a third consideration that will greatly affect our national agricultural policy after the War. It has been estimated that before the War we were spending some £250,000,000 per annum in the purchase of corn and other foodstuffs of a kind that could be grown within the country. Before the War this may have been very good business from a trader's standpoint, for we paid other countries by sending to them £250,000,000 worth of the coal, machinery, cotton goods, etc., produced in this country. After the War the position will have altered. We have incurred huge debts, and our coal and the goods which we manufacture must be exported to pay these debts. Every pound's worth of food that we can grow for ourselves will make the paying of our debts easier. If there is enough employment in other necessary industries it might possibly pay us better, as a matter of trade, to employ our workers in these industries and to export the products of their work to pay for food. But for reasons which I have already indicated, employment on necessary industries may be hard to find. If this is so, and the labour can be employed in agriculture, even though tillage may prove less remunerative to the farmer than grass farming, the nation would be a gainer by tillage; for while the farmer reckons in net values, the nation reckons in gross.

Adopting pre-war values, the following example may be given: The gross value of the produce of 100 acres of medium quality grass set aside for grazing cattle would be £300 to £400 per annum, but the corn crops, roots and temporary grass from 100 acres of medium land worked on a 4-course rotation would be worth from £700 to £800. It is obvious that if an additional £400 worth of food can be grown at home without causing

other industries to suffer, the nation has £400 more with which to pay its foreign debts.

The foregoing consideration seem to me to justify the Prime Minister's Manchester programme, and I expect that after the War he will gain many adherents from urban electorates to support the propositions that " It is in the highest interests of the community that the land in the country should be cultivated to the fullest capacity. . . . In the future we must see that its representatives have the necessary attention and encouragement."

I do not wish to read into the words of Mr. Lloyd George more than they were intended to express; but when he spoke of " attention and encouragement " he no doubt had the provisions of the Corn Production Act in view. These two things will go together. The farmer would like " encouragement," but could very well, he thinks, do without " attention." He is sick of the sight of " officials," and even his own neighbours and friends, now that they are enrolled in Executive Committees and what not, are less welcome on his premises than they were before!

But, if I am right in my surmise that we shall not return to our pre-war agricultural policy, this pair, in the farmer's view this awkward pair, "attention and encouragement," have come to stay, and we had better get used to seeing them go in double harness as quickly as we can.

The pair will speed the plough as certainly as any pair of powerful Shires or smart-stepping Clydesdales; for it needs no prophet to foretell that, if the British public once give their attention to the products of the land they will insist on an increase in the quantity of food; there will be but little sympathy for the man who comes forward with the excuse " Knowing that thou art a hard master my one talent lies buried beneath the grass "; the grass and the talent will both come up and will pass to the man prepared to multiply production ten-fold.

This is my forecast of the fate of our Food Production Policy and of the prospects for British Farmers after the War.

THE TEMPORARY LEY.

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INTRODUCTION.—In view of the fact that some 1,527,000 acres of permanent grass have been broken up for the production of cereals and other essential foodstuffs during the period of the War, the question of the best means of bringing much of this land into rotation husbandry will become an urgent one. An important aspect of this problem will be the position that the temporary ley should take in the rotation. It will be generally admitted that in many parts of the country the soil and climatic conditions are not suitable for a rotation based on the one-year ley, and that a longer period under grass is desirable. This, of course, applies in particular to regions of high rainfall and hilly districts such as occur in the West and North of England, and in Wales. It is the more important that attention should be given to the problems connected with the formation of good temporary grass when it is remembered that after the Napoleonic and Crimean wars much of the land then brought under the plough to meet the Nation's needs was allowed to tumble down to grass without any forethought, and with no adequate seeding, and was subsequently permitted to lapse wholly from cultivation.

It is proposed in this article to deal with one aspect of the temporary ley only, namely, the selection of an adequate seeds mixture, and it will be assumed that the three- to four-year ley will enter into the after-the-war rotation in certain districts. It should be realised that a temporary ley will have failed in its purpose, and will not have fully justified its place in the rotation unless it has

1. Established itself rapidly.
2. Maintained a uniform productivity over the whole period of its duration.
3. Given rise to a weedless sward.
4. Left abundant leguminous residues to be ploughed in for the benefit of the subsequent arable crops in the rotation.
5. Given in the aggregate as much keep as, or more than, would the same field over the same period had it been left in permanent grass

The selection of a good seeds mixture will not of itself guarantee success in each of the above directions, but the seeds mixture should be regarded as the foundation upon which to build, for, given a wise selection of plants, proper manurial treatment and reasonable management should enable these plants to establish themselves rapidly and to attain to maximum luxuriance. The selection of a seeds mixture would seem, however, to involve much more than is generally supposed; it does not entail merely the choice of the seeds of species that may be expected to succeed under the various conditions of soil and climate; it is probably necessary also to consider (*a*) the question of the variety or sub-species of the selected plants, and the country or district of origin of the seed; and (*b*) the relation of the sown species to those indigenous herbage plants that will always colonise on artificial grass land to a greater or less extent.

It will be necessary for the purpose of this article to give the results of investigations carried out over a period of five years in Wales, and of an inquiry undertaken on behalf of the Food Production Department in the summer of 1917. The following counties were then visited:—Devon, Cornwall, Dorset, Wiltshire, Herefordshire, Staffordshire, Leicestershire, Lincolnshire, Derbyshire, Lancashire and East Suffolk.*

Twelve extensive series of plot trials (four ½-acre plots at each centre) were put down in Central Wales in the spring of 1915†. It was intended to make an exhaustive botanical analysis of these each season for four years. It was not, however, possible to do this after the first year, owing to the writer being called away for special work in connection with the War. These and other plots were, however, visited during 1917, and rough estimates of the herbage were made by a modification of the methods generally used in exact grass land investigations.‡

* Thanks are due to the agricultural organisers of the above counties, to the late Mr. Leighton, of Newcastle-under-Lyne, and to Mr. H. H. Dunn of Bournemouth and Salisbury, for valuable help in connection with the inquiry.

† These trials were arranged by the writer in his capacity of Adviser in Agricultural Botany at Aberystwyth, and were under the supervision of the agricultural organisers for Cardigan, Merioneth, Montgomery, Carmarthen, Pembroke, Radnor and Brecon. The mixtures in lb. per acre are given in "Grass Land and Ploughland," p. 35, Supplement No. 17 to this *Journal*, May, 1917.

‡ See the *Journal of Agricultural Science*, Pasture Problems.

(*a*) Drought Resistance, Vol. V., Part 2, March, 1913.

(*b*) The Response of Individual Species under Manures, Vol. VI., Part 4, November, 1914.

(*c*) Indigenous Plants in relation to Habitat and Sown Species, Vol. VIII., Part 1, September, 1916.

The method employed consisted in traversing the plots and taking readings with a mesh, but, instead of counting the individual plants, obtaining comparisons by working on a system of marks. This plan was also adopted when visiting the several counties in 1917. It cannot be claimed that data collected on the lines indicated are as reliable as those obtained by the more exact methods previously used. It is, however, felt that the figures may be taken as strictly comparative, and therefore sufficiently accurate for the immediate purpose of estimating the relative success of the different sown and unsown species under various conditions.

It will be convenient to consider the chief herbage plants separately, and in connection with each briefly to review the data available. The conclusions to be drawn will be summarised at the end of the article, *and a case will be made for an extension of grass and clover seed production in this country.*

THE LEGUMINOUS HERBS.

Red Clover.—Red Clover is usually the foundation of ordinary one-year rotation leys, and is almost invariably included in mixtures for 2 to 4 years; when employed in the formation of these longer leys it is most desirable to use a strain of Red Clover that will "hold" into the second, and if possible, into the third year. Very little accurate information has in the past been collected as to the degree of persistence of the various commercial strains of Red Clover. The following data may, however, be cited:—

Central Wales.—The Red Clover in the mixtures on the four plots (previously referred to) was as follows:—

Plot 1.—3 lb. Broad-leaved Red Clover per acre.
,, 2.—3 ,, Perennial Red Clover per acre.
,, 3.—3 ,, Late-flowering Red Clover per acre.
,, 4.—4 ,, Mixed Red Clovers per acre.

The results (in the second year) were as follows: At three of the centres there was no trace of Red Clover on the Broad Red Clover Plot. At five of the centres there was no trace of Red Clover on the Perennial Red Clover Plot, and at only one centre (at which the Red Clover had failed on all the Plots) was there no trace of Red Clover on the Late-flowering Red Clover Plot. At the eleven centres where the clovers had taken well the Late-flowering Red Clover was in every case more abundant on the plots than was the Broad Red or Perennial Red Clover. The average of all the plots, moreover, showed that Late-flowering

its

per acre (in the second year) than either the Broad Red Clover or the Perennial Red Clover. At three of the centres there was very nearly as much Red Clover on the Late-flowering Red Clover Plot in the second year as in the first. Observations made in the winter of 1916 on plots put down in the spring of that year* have shown that Chilian Red Clover comes rapidly into luxuriance during the first autumn after sowing and tends to flower more freely at this period than other clovers; at two centres it was injured more by frost, and at one of these (at 1,000 ft.) it had suffered much greater injury during the winter than had the clover on plots sown with seed harvested on the Cotswolds, in Dorset and in Montgomery. Observations on a large number of fields, in connection with advisory work on seeds mixtures in Central Wales have, moreover, shown that generally speaking the clovers that persist best into the second year are those harvested in Montgomery and in the Cotswolds; cases have, however, been noted where French and Canadian seed have also given plants that have "held" well.

Derbyshire.—Estimates made on the herbage on a series of plots three years down, showed that Broad Red Clover and Late-flowering Red Clover had persisted into the third year, but that there was twice as much clover on the latter plot as on the former.

Devon, Cornwall and Leicestershire.—A number of instances were met with in these counties where locally grown Red Clovers had persisted well into the second year, but no comparative plots were available for investigation. The writer was informed that excellent and persistent strains of Red Clover were harvested in the Wadebridge and Morwenstowe districts of Cornwall.

It must, of course, be remembered that Red Clover, like White Clover, is a common indigenous plant on British grass lands, and is greatly increased by dressings with phosphatic manures. Whereas White Clover may often make a strong indigenous appearance on a prepared ley (even when Wild White Clover is not sown) Red Clover seldom comes in by itself before about the fifth year, and since it is not a stoloniferous plant it does not gain on the ground with the rapidity of White Clover. The fact remains, however, that indigenous Red Clover is a persistent perennial, which, like Wild White Clover and other indigenous clovers, does not appear to be subject to clover sickness. Red Clover, although certainly a native

* It was unfortunately impossible for the writer to visit these plots

plant, only locally manifests itself as a really abundant indigenous constituent in old grass lands, and is usually more plentiful on meadows than pastures. Observations suggest, moreover, that indigenous Red Clover shows partiality for, or at least becomes more abundant on, heavy soils. It was found plentifully on Boulder Clay at Saxmundham, on very retentive clays in Dorsetshire, and was a dominant plant on certain heavy soils near Holsworthy, Devon. In Central Wales also it is sometimes locally abundant on heavy soils, and experience suggests that it is actually favoured by large and frequent dressings with farmyard manure.

It would seem evident from the above considerations that genuine Late-flowering Red Clover is a definite variety, and is a most valuable plant for leys of longer duration than one year; and it should be remarked that it also bulks very largely in the first hay crop. It is desirable that genuine stocks of this clover should be greatly augmented. The evidence suggests that "Perennial Red Clover" and "Cowgrass" are frequently nothing but trade names, and do not behave in a manner at all different from the ordinary Broad-leaved Red Clover. There can be little doubt also that the seed of Wild Red Clover would be most valuable in the preparation of four-year leys, and would probably give rise to a Red Clover which would persist for the whole duration of the ley. It is, therefore, to be hoped that genuine stocks of this seed may, like Wild White Clover, become a commercial commodity.

Alsike Clover.—This clover is not an indigenous plant, and consequently does not occur on fields where it has not been sown.* Trials have not been made to estimate the relative value of English, Canadian and Continental stocks of seed, and no opportunity presented itself for making field comparisons. The available evidence shows, however, that Alsike Clover frequently persists well into the second year. At seven out of twelve centres in Central Wales Alsike persisted into the second year in greater amount than either Broad Red Clover or Perennial Red Clover; whilst at two centres only had it persisted in greater amount than Late-flowering Red Clover. On the average of the twelve centres, Alsike Clover (in the second year) contributed 3·5 times as many plants per acre as either Broad Red or Perennial Red Clover; whilst Late-flowering Red Clover contributed 5·5 times as many plants as Alsike Clover. Data collected in other districts also gave

* Except, of course, where it may have been introduced as an impurity in other seeds, or accidentally introduced by other means.

evidence of the greater numerical persistence of Alsike Clover than of Broad Red or ordinary Cowgrass or Perennial Red Clover; whilst an estimate made on plots on the Millstone Grit in Derbyshire showed both Alsike and Late-flowering Red Clover in appreciable amount in the third year; the latter species, however, contributed twice as many plants to the acre as the former. In the Ulverston district of Lancashire Alsike Clover was also found to be quite abundant in the third year. A number of observations made on leys in their first year, at high elevations in Central Wales, had shown, moreover, that Alsike Clover often survives exceptionally cold and wet winters very much better than any of the varieties of Red Clover, and this would seem to be true also of much of the high land of Derbyshire and Lancashire.

When Red Clover and Alsike Clover are included in a mixture, and both clovers "take" equally well, all the varieties of Red Clover usually contribute more to the first hay crop than does Alsike Clover. Average figures obtained from seven of the twelve centres previously referred to in Central Wales, where the hay was weighed, showed the following relationships:—

Plot 1	Broad Red Clover contributed	26 per cent. by weight to the first hay crop.
	Alsike Clover contributed ..	7 per cent. by weight to the first hay crop.
,, 2	Perennial Red Clover contributed	20 per cent by weight to the first hay crop.
	Alsike Clover contributed ..	13 per cent. by weight to the first hay crop.
,, 3	Late-flowering Red Clover contributed	44 per cent. by weight to the first hay crop.
	Alsike Clover contributed ..	5 per cent. by weight to the first hay crop.

At the only centres—two out of twelve—where Alsike Clover contributed a greater bulk to the first year's hay than the varieties of Red Clover, the Red Clovers had almost completely failed to "take."

From the above it seems evident that Alsike Clover is especially valuable for two chief reasons: firstly, it safeguards a stand of clover in the first year, and should, therefore, always contribute to mixtures in wet and cold districts,* and secondly it persists into the second and third year better than Board Red or the ordinary commercial Cowgrass or Perennial Red

* It is also far less liable to clover sickness than the Red Clovers, and should also be a constituent of mixtures in clover-sick districts.

Clovers. The genuine Late-flowering Red Clover, however, usually persists better than Alsike, and also tends to suppress Alsike Clover in the first year, consequently these two plants are not complementary to each other, and should not both be included in large amount in the same mixture.

White Clover.—In order to form a just estimate of White Clover it will be necessary to differentiate between (1) Wild White Clover, (2) Commercial White or Dutch Clover (*a*) harvested in England, and (*b*) harvested in America or on the Continent.

(1) *Wild White Clover.*—This is the native plant which is indigenous on grass lands throughout the country, occurring as it does in large amount on the best fattening pastures, and frequently also on quite poor types of grass-land. It is a plant which if present on a field even in minute quantities responds freely to basic slag, and rapidly increases in amount under the influence of this manure.

The great value of Wild White Clover in the formation of artificial grass depends largely on the degree of rapidity with which it forms a sward, and thus keeps out weeds; and its effect on the fertility of the land for subsequent arable crops when the turf is broken and the residues are ploughed down. Professor Gilchrist and others have also proved that an abundance of White Clover in a sward has the effect of adding to the productiveness of the hay crop over a number of years,* and that it adds materially to the grazing value of pastures.

It is unfortunate that many of the trials on Wild White Clover have not been so designed as to take into account the indigenous unsown plant, and that in many cases where excellent results have undoubtedly followed upon the use of Wild White Clover, it has not been possible to form a proper quantitative estimate of these results, owing to the absence of control trials. The following evidence may, however, be cited:—

Central Wales.—Four plots were put down in 1915 on a poor field at about 900 ft. above sea level. The mixture was the same in each case except for the following variations:—Plot 1, ¾ lb. of Wild White Clover; Plot 2, ¾ lb. Commercial White Clover; Plot 3, no White Clover; Plot 4, 2 lb. of Commercial White Clover.

An estimate was made 18 months later as to the abundance

* "Trials of Wild White Clover," by Douglas A. Gilchrist, M.Sc., F.R.S.E. This *Journal*, Vol. XXII., No. 11, February, 1916, p. 1063.

of White Clover on the plots. The average results may be expressed on a comparative scale as follows :—

Indigenous White Clover, unsown	100
¾ lb. Commercial White Clover	120
2 „ Commercial White Clover	240
¾ „ Wild White Clover	410

At two other centres at about 700 ft. the results at 18 months were as follows :—

Indigenous White Clover, unsown	100	and 100
1 lb. Commercial White Clover	300	„ 240
½ „ Wild White Clover	385	„ 350

Estimates were also made at twelve centres after the plots had been down for 28 months, and again expressing the Indigenous White Clover (unsown) at 100, the average results may be expressed as follows :—

Indigenous White Clover, unsown	100
1 lb. Commercial White Clover	90
½ „ Wild White Clover	395

It should be added that, on the average of all the centres at 28 months, weeds were twice as plentiful on the Commercial White Clover Plots (least clover) as on the Wild White Clover Plots (most clover).

At every centre the Wild White Clover Plot had beaten the Commercial White Clover Plot and the Indigenous (unsown) Plot, whilst at six of the centres the unsown plot had actually beaten the Commercial White Clover Plot.

It has not been possible to make estimates in this district on plots where Wild White Clover had been included in the mixtures that had been down for longer than about 28 months. Estimates and observations made on leys three and four years down, both when ordinary Commercial White Clover had been used, and when no White Clover had been sown (*i.e.*, when the White Clover on the fields was the locally indigenous plant, having come in naturally) supply further data. A series of trials three years down at about 750 ft. showed that the plots upon which 2 lb. of Commercial White Clover had been included in the mixture, actually contained less than half as much White Clover in the sward as the plots where no White Clover of any sort had been sown. The field had had a dressing of superphosphate with the last corn crop, but no phosphatic manures were subsequently added to the sward. White Clover (unsown) frequently contributes 10 per cent. to 15 per cent. of the ground herbage (on basis of number of plants per unit of area) by the

third and fourth year on leys in this district,* an amount which it may be safely said is not exceeded when Commercial White Clover has been included in the original mixture, whilst under the influence of lime and liberal dressings of basic slag cases have been noted where the unsown and indigenous contribution of this plant amounted to as much as 34 per cent. in the third year. An interesting case has also been noted where this plant and Rough-stalked Meadow Grass had together made an indigenous (unsown) contribution to the sward of 35 per cent. in no more than two years.*

North Wales.—Trials conducted by Jenkin† have shown that on the average of a number of plots, 2 lb. per acre Wild White Clover give somewhat better results at 18 months than Commercial White Clover, whilst at 30 months, on the average, the Wild White Clover covered nine times as much ground as the Commercial White Clover.

Staffordshire.—A number of leys in which either Wild White or Commercial White Clover had been included in the mixtures were visited. At three to four years all of these showed to the marked advantage of Wild White Clover, as the following comparative figures (the average of five sets of comparisons) indicate :—

Unsown Indigenous White Clover	100
1 lb. Commercial White Clover	100
1 ,, Wild White Clover	426

On a field eight years down, however, unsown Indigenous White Clover was but little less plentiful than Wild White Clover. With but one exception weeds were decidedly less plentiful on the fields where Wild White Clover had been included in the mixtures.

Herefordshire.—Mr. Porter has conducted plot trials in this county, which have demonstrated the value of Wild White Clover.‡ Fields three and six years down were remarkable for a great development of Wild White Clover; comparison between a plot sown with a good mixture, including Wild White Clover, showed over five times as much White Clover at three years as the rest of the field where White Clover had not been sown.

The influence of Wild White Clover in suppressing Bent,

* See Pasture Problems (*c*) footnote p. 1281.

† "Ordinary White Clover Seed *versus* Wild White Clover Seed," by T. J. Jenkin, B.Sc. ; this *Journal*, Vol. XXIII., No. 12, March, 1917, p. 1202.

‡ See "A Big Stride in Agricultural Improvement," by John Porter, B.Sc.

Yorkshire Fog and weeds was again demonstrated, and is indicated by the following comparative figures :—

Field Three Years Down.

	Wild White Clover included in the Mixture.	*No Wild White Clover included in the Mixture.*
White Clover	575	100
Bent	68	180
Yorkshire Fog	24	96
Weeds	40	156

Lancashire.—Several instances of the value of Wild White Clover were seen in this county, more particularly in the Ulverston district, where, as in other localities, it had a decided influence in suppressing weeds, and at two and three years had added very much to the amount of White Clover on the plots. Indigenous White Clover, however, gains rapidly on many fields in this district, and in one instance was nearly as plentiful at three years as when the seed of Wild White Clover had been included in mixtures.

Leicestershire.—A 2-year ley was visited, 1 lb. of Wild White Clover having been included in the mixture; the field was exceptionally free from weeds, and White Clover was abundant on the sward.

From the above facts it would seem evident that in the majority of cases the inclusion of even small amounts of Wild White Clover in a mixture begins to exert a beneficial influence on the herbage after about 18 months, and by 28 to 30 months will have given a decided character to the sward—a character that can seldom, if ever, be obtained so quickly by the reaction of slag on the unsown indigenous plant. In certain localities, especially those of high rainfall, *e.g.*, in Central Wales and the Ulverston district of Lancashire, it not infrequently happens, however, that after the lapse of four, or even three years, no great difference is to be seen between fields or plots sown with Wild White Clover, and those where the White Clover present has been solely due to the natural development of the unsown indigenous plant. The value of Wild White Clover as a means of suppressing weeds is, moreover, seen to be more fundamental than is generally realised. In this connection it is necessary to emphasise an important symbiotic relationship that undoubtedly exists between Indigenous White Clover and Indigenous Rough-stalked Meadow Grass, the two together often rapidly forming a close sward which tends to dominate

the ground flora, and thus to suppress mat herbs and other weeds natural to temporary leys.

Jenkin has furthermore remarked that indigenous Wild White Clover tended to be plentiful on certain plots sown with Rough-stalked Meadow Grass, and a case has been previously referred to where Rough-stalked Meadow Grass and White Clover had dominated the sward on a ley in the third year, although neither plant had been included in the original mixture. Evidence collected in Central Wales and in the districts visited in 1917 has conclusively proved that when Wild White Clover (the indigenous plant) was included in a mixture the Rough-stalked Meadow Grass was usually far more plentiful than when it was not included, and this both when Rough-stalked Meadow Grass was left to make an indigenous (unsown) appearance and when the commercial seed was sown. Comparisons in Staffordshire showed indigenous Rough-stalked Meadow Grass to be nearly twice as plentiful on 2 and 4 year leys sown with Wild White Clover as when this plant was not included. Mr. Porter's trials in Herefordshire also gave evidence of the remarkable connection between the development of these two plants; both had been included in mixtures, and the excellence of the sward on 3-year old leys was in no small measure due to the successful development of Rough-stalked Meadow Grass and the paucity of weeds.

It must not, of course, be supposed that Wild White Clover will always succeed when included in a seeds mixture; there is always the risk that this, like other seeds, may fail to "take." Jenkin found that a partial failure resulted (at 18 months) at one of his centres following upon a dressing of basic slag and sulphate of ammonia, which produced a very heavy crop.

Partial failure also occurred at two centres in the case of the Central Wales trials, where the first hay crop had been exceptionally heavy (although no artificial manures had been applied). The greatest success was, moreover, achieved at the single centre where no hay had been taken.*

The evidence suggests that the seed of Wild White Clover should be included in all mixtures for three- and four-year leys;

* Manurial trials on permanent grass have demonstrated that inorganic nitrogenous manures depress clover development (see Pasture Problems (b) footnote p. 1281); it would seem from the above, however, that in the case of young leys, any course that makes for an exceptionally heavy hay yield may have a disastrous effect on White Clover (even after the seeds have successfully "taken"), and that the bad effect of nitrogenous manures may often be in part due to this secondary cause. Single small dressings of nitrogenous manures (including liquid manure) often have no depressing influence on Red

it hastens sward development, encourages Rough-stalked Meadow Grass, keeps out weeds and makes for fertility. As to whether it should be included in mixtures for two-year leys or for permanent grass will depend on local conditions. It is certain, however, that in the best interests of agriculture, far larger supplies are urgently needed, and that the price of the seed should not be allowed to stand at its present exorbitant level.

(2) *Commercial White Clover.*—The writer is not aware that trials have been conducted to estimate the relative value of White Clover harvested in America, on the Continent, or from ordinary commercial seed in England. The trials referred to above clearly show that Wild White Clover produces both a more lasting plant than does the ordinary commercial seed, and also that it forms a sward very much more quickly, Observations made on leys in Dorset, however, give evidence to show that in some instances commercial seed harvested in that county give results nearly, if not quite as good as those obtained from the use of Wild White Clover. It was ascertained that White Clover is frequently harvested from leys that have been down 3 or 4 years, by which time a considerable amount of indigenous (unsown) White Clover would often have made an appearance. The parent seed used in the preparation of these leys, although perhaps originally the progeny of seed of foreign origin is, moreover, frequently obtained from seed harvested on the same or adjoining farms the year previously; consequently in districts where it is the practice to postpone harvests until the third or fourth year, the stocks freed year by year by a process of elimination and substitution become more and more "natural." It would appear, therefore, that "English" White Clover, although generally speaking of less value than "Wild White" Clover, is on the average of decidedly greater value than "Foreign" White Clover in the preparation of two- and four-year leys.

There is evidence for supposing that although ordinary Commercial White Clover, especially when sown at the rate of 2 lb. to the acre and upwards, will produce abundance of White Clover for a two-year ley—that this great development of a short lived variety of the plant tends to suppress or actually kill the indigenous (unsown) variety, and thus at three, four or five years a plot or a field sown with a mixture containing no White Clover may actually have more, and in many cases altogether more clover in the herbage than one originally

Yellow Suckling Clover.—This plant, like White Clover, is strongly indigenous in Britain, but as an abundant contributor to our grass-lands is much more localised. It is very plentiful in many parts of Devon, and in Central Wales, where it may become almost the dominant plant, especially on the aftermath. In these districts this clover is held in high esteem by flock-masters for the purpose of fattening lambs on fields after the hay has been harvested. In the writer's view Yellow Suckling Clover should be regarded as a valuable herbage plant in regions of high rainfall, and on non-calcareous soils where it is difficult to obtain good "stands" of Red Clover or even of White Clover. In Central Wales it usually makes an unsown appearance in about the third year, and attains to maximum development by about the fifth or sixth year. On plots at the Seale-Hayne Agricultural College, Devon, sown five and seven years ago with an Elliot mixture, Suckling Clover, although, of course, not included in the mixture, proved to be the dominant or co-dominant plant when the plots were visited in 1917. Plot trials in Central Wales, when the commercial seed was included in mixtures, and also observations made on leys where the seed had been used, have not given uniform results. At two centres in the second year, there was decidedly more Suckling Clover where the seed had been sown, but, generally speaking, its inclusion in mixtures has not proved an economic success, and there can be little justification for its use unless a good "plant" can be obtained by the second year, *i.e.*, as soon as the Red Clover fails and before the Suckling Clover would have made an indigenous appearance. The commercial seed often consists of upwards of 50 per cent. "hard" seed, and is, in the generality of cases, of foreign origin.

Trefoil.—This is a valuable plant for short leys for sheep grazing, especially on calcareous soils, and for resowing gaps in rotation leys. There does not, however, appear to be any reliable evidence as to the rival merits of English and French seed. The seed of this plant is both cheap and free from weed seeds, and it is consequently used to a large extent in mixtures for leys of two to four years' duration, quite regardless of soil and climatic conditions. In Central Wales, especially at high altitudes on non-calcareous shales, it is invariably a total failure from seeding. At the 12 centres in Central Wales previously referred to, Trefoil only contributed an appeciable amount to the herbage at two centres, and at each of these it developed in irregular patches only, and tended to suppress more valuable

plants. Trefoil was included in some of Mr. Porter's mixtures in Herefordshire, but had completely died out by the third year; on very poor sands in Lincolnshire it had, however, from seeding, maintained itself in moderate amount for four years. This plant is generally included in mixtures for three- to four-year leys at high elevations in Derbyshire and in the Ulverston district of Lancashire. In Derbyshire it may sometimes be useful in the first year if the Red Clover fails, but Alsike Clover would probably serve the purpose equally well. Trefoil was not seen in older leys to any considerable extent, and it would seem difficult indeed to make a case for its inclusion in mixtures in the Ulverston district. It is beyond dispute that in many districts Trefoil is quite a worthless plant, and it is very doubtful if it should be used for three- to four-year leys (except possibly in a few well-defined localities), in as much as, if successful, it only tends to suppress more valuable herbs.

GRASSES.

It was not possible to collect accurate data as to the relative success of the various grasses when seed of different countries of origin was employed. Plots put down by farmers in Central Wales with mixtures supplied by leading seed houses have frequently come under observation. The mixtures have usually been substantially the same; it has been noted on several occasions, however, that certain species of grasses have succeeded much better on one plot than the others. This has applied in particular to Cocksfoot, Timothy, Rough-stalked Meadow Grass and Tall Fescue; and it is not improbable that the source of origin of the seed may afford the solution to a somewhat baffling problem.

Perennial Rye-grass.—Stapledon and Jenkin* have shown that in Central Wales Perennial Rye-grass usually falls off rapidly by the third or fourth year after seeding. The evidence collected during 1917 showed that the same was true in the majority of English districts visited. The Perennial Rye-grass found in the herbage on prepared leys in the fifth and subsequent years is in most cases probably almost solely of indigenous origin. In districts where Perennial Rye-grass is not indigenous, the grass disappears from the herbage in about the fourth year, its place first being taken by Yorkshire Fog and Soft Brome Grass, and later by Bent, Sweet Vernal Grass and

The practice of introducing a high proportion of Perennial Rye-grass into mixtures intended for two- to four-year leys is undoubtedly a mistake, but it is a practice which dies very hard. Perennial Rye-grass contributes to the herbage in the first hay crop and in the second year more or less in proportion to the amount of seed sown. Provided seed of good quality is used, the available evidence, however, indicates that 14 lb. to 16 lb. should be regarded as the absolute maximum seeding for one- or two-year leys.*

The trials in Central Wales showed that 14 lb. of Perennial Rye-grass included in a mixture contributed 55 per cent. to the first hay crop; whilst a sowing of 7 lb. gave a contribution of 40 per cent. In the second year it was found that there was one-third as much Rye-grass again on the 14-lb. plot as on the 7-lb. plot.

Evidence collected in Staffordshire, Herefordshire and Derbyshire, and on fields in Central Wales, showed that by the third or fourth year a sowing of about 6 lb. to 7 lb. per acre actually gave rise to more Perennial Rye-grass than a sowing of 10 lb. to 16 lb. Fields down eight to ten years or longer may be said seldom, if ever, to show Perennial Rye-grass in proportion to the seeding; indeed, more often than not this grass is at this stage most plentiful on the unsown plots. This was well exemplified on the Saxmundham plots, where (at 14 years) if the average contribution of Perennial Rye-grass on the sown plots is expressed as 100, that on the unsown plots was 180.

It would appear from the above evidence that ordinary commercial Perennial Rye-grass, in a great many districts, should not be sown in excess of about 7 lb. per acre for three- and four-year leys, provided that by the inclusion of other species a sufficiently good herbage can be secured during the first and second years. It would seem evident also that the seed of the indigenous variety would give rise to a more persistent plant than does the ordinary commercial seed.

Timothy.—Although Timothy is an abundant indigenous plant on many types of grass land, it does not seem able to establish itself unsown on prepared fields earlier than about the eighth year. The evidence suggests that it succeeds from sowing on a great variety of soils—even on such as are relatively poor, provided the rainfall is high. It contributes to the first

* It should be emphasised that it is almost impossible to obtain Perennial Rye-grass absolutely free from Yorkshire Fog and Soft Brome—consequently the heavier the seeding the more of these weed seeds will be introduced.

hay crop in proportion to the seeding.* The Central Wales trials showed that when sown with upwards of 14 lb. of Rye-grasses, 3 lb. to the acre gave five times as much Timothy in the first hay crop as 1 lb., and when sown in but slight competition with Rye-grasses, 3 lb. gave about twice as much Timothy as 1 lb. It was also evident that Timothy bulked rather more heavily in the first year when sown with little or no Rye-grass than when either Perennial or Italian Rye-grass in liberal quantity was included in the mixture. In the second year, however, this early competition with Rye-grasses had not much hampered the production of Timothy on the plots. The plots sown with 2 lb. and 3 lb. to the acre, moreover, contained about one-third more Timothy than those sown with 1 lb. Fields six years down in Staffordshire, when 2 lb., 3 lb. and 4 lb. of Timothy, respectively, had been included in the mixtures, showed a contribution of this grass to the herbage in the relatioudship of 100 : 200 : 220.

It is probable that Timothy should be used extensively for four-year leys, and that the seedings should more often be 3 lb. to 4 lb. to the acre than 1 lb. or 2 lb. It reaches maximum development in the first year when sown alone or in but slight competition with Rye-grasses; but only in the second year when Rye-grasses in large amount are also included in the mixture. It continues abundant for varying periods according to the soil, but on all but the best soils falls off fairly rapidly after the fifth or sixth year, and may completely disappear by the eighth to tenth year.

Cocksfoot.—The behaviour of Cocksfoot is perhaps more uniform over a great variety of soils than any of our important grasses. No single case of complete failure was noticed in connection with the 1917 investigations, and this grass invariably succeeded on four- to six-year leys, more or less in proportion to the seeding up to a maximum of about 10 to 12 lb. per acre in well-balanced mixtures. Cocksfoot attained to its greatest luxuriance on leys in Devon, Cornwall, Lancashire and Staffordshire, and was least successful on certain very poor soils in Lincolnshire.

The trials in Central Wales afford valuable information as to the behaviour of Cocksfoot. The yield of the first year's hay crop was estimated at six centres.† It was found that at

* When included in ordinary mixtures this is probably true up to a maximum sowing of 5 to 6 lb. per acre.

† The estimate was made by cutting the produce from 10 measured areas (a foot square) on each plot. The green grass was taken away in sacks, made into hay on the laboratory floor and eventually weighed.

one centre only was a higher yield of hay obtained in the first year from the use of much Rye-grass and little Cocksfoot (Plots 1 and 2) as compared with the yield from Plots 3 and 4, where about 14 lb. of Cocksfoot were sown in conjunction with no more than 2 lb. of Rye-grass. At three centres Plots 3 and 4 gave a yield in excess of Plots 1 and 2 of from 8 to 17 cwt. The average yields at all the centres were, for Plots 1 and 2 together, 31 cwt. per acre, and for Plots 3 and 4 together 37 cwt. per acre. On Plots 1 and 2 Cocksfoot only gave an average of 4 per cent. to the first year's hay crop, but contributed an average of 16 per cent. on Plots 3 and 4. Estimates made on the plots in the second year, moreover, showed that Cocksfoot, when not set to compete with the Rye-grasses, had contributed about 40 per cent. more to the herbage than when Rye-grasses in excess of 9 lb. to the acre had been included in the mixture.

Estimates made on plots three years down showed that Cocksfoot (sown either in small or large amount) may not recover from early competition with Rye-grasses even by the third year.

It is probably not too much to say that Cocksfoot is the most generally successful of all the commercial seeds for temporary grass. For unlike Rye-grass and Rough-stalked Meadow-grass it is not a grass which makes a rapid indigenous appearance; indeed, in many districts, although a hedgerow plant, it is not a plentiful constituent of tumble-down leys or unsown permanent grass. Thus in the case of a three- to six-year ley the money spent on Cocksfoot is justified to a greater extent than on almost any other herbage plant, *because Cocksfoot contributes to the herbage for the whole period, and its contribution is due almost solely to the seed sown.* The farmer does not, of course, appreciate this when comparing the price of Cocksfoot with Rye-grass.

The management of Cocksfoot is not well understood; for pastures it must be sown thickly, say a minimum of 6 lb. per acre, and stocked heavily. For meadows 2 lb. to 4 lb. may be enough, the smaller sowing being used when Rye-grass is relied upon to give the first year's hay crop. Cocksfoot leys should always be put up for hay early, cut early, and dressed with artificials, including nitrogen in small amount if liquid manure is not available. This grass responds particularly well to "feeding" and does not seem to lose permanency by early "forcing" and consequent heavy yielding. All the evidence indicates that Cocksfoot and Late-flowering Red Clover are an

second year often being as heavy as that of the first, and sometimes containing nearly as much clover. Even a moderate seeding of Rye-grass (*e.g.*, 6 to 10 lb.) will have the effect of diminishing the yield of Cocksfoot in the first hay crop; this does not necessarily matter, but it may prevent the Cocksfoot establishing itself and dominating the hay crop in the second year. Cocksfoot when sown with much Rye-grass (14 lb. to 20 lb.) will not reach its maximum development before the third year, whilst without Rye-grasses it will reach its maximum in the second year. Unless well looked after and regularly 'dressed' Cocksfoot is likely to fall off after the fifth or seventh year, and in any event continues longer under meadow (or alternate meadow) than pasture conditions proper. It starts its growth early in the spring and under favourable conditions yields two heavy crops of hay in one year.

Tall Oat Grass.—This is a grass which seldom makes an appreciable indigenous appearance in prepared fields until after a considerable lapse of time, although both the ordinary and bulbous variety may spring up on land that has been newly broken and put down to grass again after but one or two arable crops. Tall Oat Grass is most successful in simple mixtures. It reaches maximum development in the first year when not in strong competition with other grasses, and in the second year when sown with excess of Rye-grasses. It may continue abundant until the fifth or seventh year, but is usually suppressed by strong competition, especially with Golden Oat Grass, by about the fourth or fifth year.

The contribution to the hay crop is deceptive. The Grass stands high above other plants and attracts the eye. The trials in Central Wales, when 3 lb. and 4 lb. were included in mixtures, showed a maximum contribution of 9 per cent. of this grass to the first hay crop and an average contribution of only 5 per cent.

During the early years it succeeds more or less in proportion to the sowing, up to a maximum of about 5 lb. or 6 lb. per acre in well-balanced mixtures. It is probable that 4 lb. to the acre should be regarded as a minimum seeding. Tall Oat Grass comes into growth very early in the spring, and is then much relished by stock, but is quite neglected later in the season, and if not grazed early will hardly be touched by animals all through the year, whilst too heavy grazing early in the spring may completely destroy the grass.

prepared fields, even in districts where it is an abundant constituent of old permanent grass; this was very noteworthy in the Blackmoor Vale district. The investigations under review, however, showed it to be a grass which succeeds from sowing over a wide range of soils; it never reaches its maximum development until the third year, and frequently not until later, and thenceforward holds the ground well, and may actually become a co-dominant grass. It enters into strong competition with Cocksfoot as well as with Tall Oat Grass. At Saxmundham it had lasted in appreciable amount for 14 years and was twice as abundant on the sown plots as on an old permanent pasture adjoining. Even ½ lb. included in a mixture may sometimes produce material results, and 3 lb. would seem to be a maximum sowing in a well-balanced mixture.

It must be noted that reliable seed is at all times very expensive, and that it is a grass but little relished by stock. Golden Oat Grass probably has a certain value for six- to eight-year leys on some classes of rather poor soil, but it is doubtful if it would ever be remunerative in ordinary mixtures for three- to four-year leys.

Meadow Foxtail.—This grass was not included in the mixtures on any of the plots in connection with the trials at the 12 centres in Mid-Wales. It had, however, been tested in earlier experiments, and had never justified itself. Analyses made on a large number of fields in Central Wales, where the seed had been included in mixtures, have also clearly shown that the plant never established itself in economic amount when used as an ingredient in mixtures. The county investigations gave evidence in the same direction: for instance, on good soils in Staffordshire, where 2 or 3 lb. to the acre had been included in the mixtures, only traces of this grass were found on leys three to seven years old, on seven fields, whilst on one field (seven years down), where the grass was found in appreciable, although not abundant amount, it was more than probable that the indigenous species had begun to make an appearance. Permanent grass and fields down over 18 years on the same soils frequently contained considerable quantities of Meadow Foxtail. In Devon, Cornwall, Dorset and Lancashire, on fertile soils where the indigenous Meadow Foxtail contributed substantially to the older grass lands, it proved to be a grass which, even when included in mixtures, was never found as more than a distributed plant on three- to five-year leys. It

contribution of Meadow Foxtail when included in mixtures in this country Consequently, since it is a grass which does not as a rule make a very appreciable indigenous appearance at all early, it is seldom met with on fields much less than ten years down, even on fertile soils.

Meadow Fescue.—This grass, although not quite so unsuccessful as Meadow Foxtail from seeding, gives no appreciable results in a great number of districts. It was included (4 lb. to the acre) in the mixture on one of the plots in the Central Wales trials. In the second year it was completely absent from the plots at three centres; only at two did it contribute appreciably to the herbage, and at both of these centres was quite insignificant in comparison with Cocksfoot and Timothy.

Meadow Fescue has, in the past, been largely used in mixtures in Central Wales; no case has, however, been met with where it has proved a real success, and at an altitude of above about 800 ft. it is almost invariably a complete failure.

This grass did not appear to have established itself either in Mr. Porter's trials in Herefordshire or in the trials on Millstone Grit in Derbyshire; and, as might have been expected, was a complete failure on poor sands in Lincolnshire. On fertile soils in Devon and Cornwall it was occasionally met with as a moderately successful contributor to three- and four-year leys. It was only in Staffordshire and Lancashire, and there on fertile soils, that Meadow Fescue, when included in mixtures, was found to be an undoubted success on three- to four-year leys. When successful it attains to maximum development in the third year, and when once established, retains its position until at least the seventh year. It was not found as a strongly indigenous plant in many of the localities visited;—it is interesting to note, however, that it was undoubtedly indigenous in Staffordshire and Lancashire, that is to say, in just those districts where its inclusion in seeds mixtures was justified.

Tall Fescue.—This grass has not in the past been included in mixtures to anything like the same extent as Cocksfoot, Timothy, Meadow Fescue and Meadow Foxtail. It is a very variable grass, and undoubtedly includes a great number of botanical forms. Tall Fescue of commerce (the Rhenish variety) was tested on two of the plots (4 lb. and 6 lb. to the acre) in Central Wales. The grass did not contribute to the first hay crop, but in the second year at three centres had made a definite, although comparatively slight contribution to the herbage. On the average of all the centres it was rather more

In Herefordshire it had made a substantial contribution to the herbage by the third year on a field where Meadow Fescue had failed, while in Derbyshire only traces of the grass were found on a field of similar age. In Devonshire, on leys five and seven years down, 2 lb. to the acre had produced a considerable development of Tall Fescue; on one field it was co-dominant with Cocksfoot. The same was found to be the case in Cornwall. On clay soils over Oölite, both in Lincolnshire and on the Cotswolds, Tall Fescue, when sown, often becomes an abundant grass on leys down over five years. On favourable soils it is, moreover, a grass which from sowing becomes quite permanent. It contributed 21 per cent. to the herbage on a field 16 years down on the Cotswolds, and it was among the four most plentiful grasses on plots 14 years down at Saxmundham.

Probably Tall Fescue is not a grass that would often pay for inclusion in mixtures for leys of under four years' duration, but it is undoubtedly a valuable plant for leys of four years and upwards, although it is not possible at present to predict upon what classes of soil it will succeed best. It would seem, however, to have a proved value for certain classes of clay soil.*

Certain very fine strains of Tall Fescue have been noted as a hedgerow and roadside plant in parts of North Devon, and in the Folkingham and Sapperton districts of Lincolnshire, and as an indigenous plant it would almost certainly repay investigation.

The Fine-leaved Fescues.—These Fine-leaved Fescues include the "Hard" "Red," "Sheeps," and "Chewings" Fescue of commerce, and the various smaller Fescues of our grass lands. They represent a number of botanical species and varieties, and demand very detailed study. For the present it will be sufficient to remark that the evidence suggests the following generalised conclusions. On the majority of soils the commercial seed, when included in well-balanced mixtures, does not give tangible results. Noteworthy exceptions were met with in the Ulverston district of Lancashire, on some poor sands in Staffordshire and Lincolnshire, where these grasses became plentiful from sowing by the third year, and persisted in some cases to the fifth or seventh year. Where successes were met with the seed used had been "Red" or "Hard" Fescue, and not "Sheeps" Fescue, and in these districts indi-

Fescues do not, however, usually make an appreciable unsown appearance before the third year at the earliest. Under natural conditions where the Fine-leaved Fescues are abundant indigenous plants—on heath pastures and mountain sheep-walks—they are usually the dominant or co-dominant elements of the flora. It is of interest, therefore, to note that the commercial seed can be made to succeed when co-dominance is assured, *i.e.*, by excessive, almost pure, sowings under lawn conditions. Some of the native varieties of *Festuca rubra* do not seem to require conditions of absolute dominance and might be very useful as herbage plants, but it is doubtful if *Festuca ovina*, an essentially poor-place plant, deserves consideration as even a potentially valuable grass for the formation of temporary leys. The commercial seed of the various Fine-leaved Fescues does not appear to give rise to a herbage relished by stock.

Rough-stalked Meadow-grass.—The commercial seed of this grass has an undoubted value in the preparation of four-year leys. In Central Wales and in other regions of high rainfall it succeeds even on relatively poor and thin soils. The Central Wales trials showed it to be a grass which contributes quite appreciably to the first year's hay crop. It failed at only one centre, and on the average of all the centres 2 lb. to the acre gave a contribution of 3·6 per cent. by weight to the first year's hay; at one centre it actually gave 10 per cent. At all the centres, with one exception, it had, by the second year, thoroughly established itself, and was to be counted amongst the four most successful plants on the plots. Good results in the second to fourth years from the inclusion of the seed in mixtures were also noted in Herefordshire, Derbyshire and Leicestershire.

Rough-stalked Meadow-grass makes a rapid indigenous appearance on many soils, and the plant may sometimes be as abundant on fields down for over three years when the commercial seed has not been included in mixtures as when 1 to 2 lb. per acre have been sown. This has proved to be the case in Central Wales, Staffordshire and the Ulverston district of Lancashire. The indigenous plant will, more often than not, have caught up its sown counterpart by about the sixth year, but at Saxmundham, even fourteen years after seeding, the plots where 3 lb. to the acre had been included in the original mixture showed to the advantage of those where no Rough-stalked Meadow-grass had been sown.

As a pasture plant the great value of Rough-stalked Meadow-grass is dependent on its capacity for sward formation

in conjunction with Wild White Clover. When employed in mixtures it should be used in moderate amount, say 1½ to 2 lb. per acre—sowings of but little more than ½ lb. are usually without effect. It is not a grass greatly relished by stock.

Crested Dogstail.—This grass does not succeed from sowing on very poor sands, and is not an abundant indigenous plant on such soils. It is strongly indigenous on practically all other types of soil, being met with as a co-dominant plant alike on dry calcareous fields and on ill-drained meadows. It proved to be a valuable contributor to the first hay crop in the Central Wales trials. On the average of all the centres it gave 6 per cent. by weight to the hay, with a yield of over 10 per cent. at three centres. By the second year Crested Dogstail had established itself well at every centre. The evidence obtained both in Wales and in the several districts visited in England suggests that it is a grass which often becomes as abundant by the fourth or fifth year, when left to make an indigenous appearance, as when included in mixtures, and that by the tenth year or even earlier it will often be less plentiful on sown than on unsown plots or fields.

Crested Dogstail is much relished by stock, despite the fact that the flower heads are never grazed, and since it contributes more to the hay than is generally realised, it is undoubtedly a valuable grass for the formation of three- to four-year leys, and this applies equally to wet and dry districts.* It is probable that 1½ lb. to the acre should be regarded as a minimum contribution to a well-balanced seeds mixture.

Smooth-stalked Meadow-grass.—This grass has not been met with in appreciable amount on fields investigated in Central Wales, and had not proved successful when included in seeds mixtures; nor, in the English districts visited, was evidence obtained that the commercial seed is of any value.

MISCELLANEOUS HERBS.

Chicory.—This plant, even in districts where it is indigenous, does not appear as a native plant on prepared or old grasslands. From sowing, it succeeds on a wide range of soils whether the plant is endemic to the locality or not. It established itself well at all the centres in Central Wales; it gave a contribution of about 5 per cent. to the first hay crop when 3 lb. per acre

was included in the mixture, and was practically as abundant in the second as in the first year. It had maintained itself in good amount for seven years in Devon and Cornwall, and in moderate amount for four years on poor sands in Lincolnshire; in Herefordshire it had died out by the sixth year. Therefore Chicory is of decided value in the preparation of four-year leys, and this is especially so when grazing for sheep is required, for it makes an early growth in the spring. Three pounds is probably to be regarded as the maximum sowing per acre; 4 lb. on plots in Central Wales produced more Chicory than was desirable.

Burnet.—This plant has an undoubted value on very poor sands; it was more successful than Chicory on sands in Lincolnshire. It becomes, however, very woody after a few years, and should not be used in mixtures except on the poorest soils.

Yarrow.—This is a strongly indigenous plant on many soils, and when once established it would seem to remain permanent. Conclusive evidence of the plant having definitely established itself from seeding has not been obtained, and whether included in mixtures or not, it is seldom much in evidence before at least the third year. The opinion is held in several districts that Yarrow has a decided value for dairy cattle. It is a fact that the plant is frequently abundant on some of the best pastures in the country, and that it is grazed by cattle to a certain extent. Further information is required as to the economic value of this plant.

Ribgrass.—Ribgrass is still used in cheap seeds mixtures. It withstands drought well, and produces a herbage on very poor, sandy soils when almost everything else fails; on such soils it is probably of decided value, but on good land the evidence suggests that it should not be included in mixtures.

SUMMARY AND GENERAL CONCLUSIONS.

An endeavour has been made to examine in some detail the behaviour of those plants, the seeds of which are commonly employed in the formation of both temporary leys and more permanent grass. It has been sought to contrast, as far as possible, the relative capacities for sward formation of indigenous species and their commercial counterparts, and to give some indication of the duration and year of maximum yield of both the sown and unsown varieties of the species in general use. It will be convenient firstly to summarise the [illegible] of the article secondly

to discuss the selection of a seeds mixture for a two-year anc for a four-year ley in the light of this evidence, and thirdly t(state a case for the systematic production of grass and clove seed in this country.

Summary of the Evidence brought forward.—The main facts ma be usefully set out in tabular form as follows :—

Species.	The Permanency of Herbage Plants.			
	When Included in Seeds Mixtures.		When they make an Unsown Indigenous Appearance.	
	Year of Maximum Yield.	Usual Duration.	Year of Entry.	Maximum Development.
Perennial Ryegrass	1	3—5	3—5	10 and upwards.
Cocksfoot	2—3	5—8 and frequently upwards	seldom before 5	10 and upwards.
Tall Fescue ..	3—5	8 and upwards	seldom if ever	—
Meadow Fescue ..	3 (only successful on certain soils).	7—8	about 6	15 and upwards.
Meadow Foxtail ..	(seldom if ever successful).	—	seldom before 10	20 and upwards.
Tall Oat Grass ..	1—2	5—7	seldom before 6	uncertain.
Golden Oat Grass..	3—4	8 and frequently upwards.	seldom before 10	probably 15 and upwards.
Timothy	1—2	*5—10*	*seldom before* 8—10	*probably 15 and* upwards.
Rough-stalked Meadow-grass.	3—5	8 ; later probably chiefly indigenous.	2—3	May be as soon as 4 and upwards.
Fine-leaved Fescues	3 (seldom successful).	6 ; later probably chiefly indigenous.	3—4	30 and upwards.
Crested Dogstail ..	3—4	6—8 ; later probably chiefly indigenous.	2—3	7 and upwards.
Commercial Broad Red Clover, Cowgrass and Perennial Red Clover.	1	Frequently one only, sometimes 2 *ex* English seed.	—	—
Late-flowering Red Clover.	1 ; occasionally 2	2—3	—	—
Indigenous Red Clover.	no data	no data	seldom earlier than 5—6.	8 and upwards.
Commercial White Clover.	2	2—3 or occasionally 4.	—	—
Wild White Clover	3—4	*10 and upwards*	*3—4*	*6 and upwards.*
Alsike Clover ..	1	2—3	—	—
Yellow Suckling Clover.	probably 2	probably 2—3	2—3	4 and upwards.
Chicory	1—2	4—10	seldom if ever	—
Burnet	3	4 and sometimes upwards.	?	?
Yarrow	seldom before 4	8 and upwards	3—4	10 and upwards.

The above table cannot be regarded as complete, since it i: not based on a sufficiently exhaustive enquiry ; and the behaviour of all species will, of course, vary according t(conditions of soil and climate. It is possible, however, as ar outcome of the work so far conducted, to group the species int(fairly well-defined categories as follows :—

A.—*Those species which, if not sown, will, in certain localities never make an indigenous appearance, but which, if the ordinar commercial seed is sown, may become permanent contributions t*

e sward.—The number of species of which this may be said but few. The outstanding examples are Golden Oat Grass nd Tall Fescue, both of which frequently become permanent the true sense of the word, when sown in districts where either species is indigenous. In certain localities it would eem that Timothy behaves in a similar manner, whilst Cocksoot, although it is seldom entirely absent as an indigenous lant, will frequently from commercial seeding contribute ubstantially to a permanent sward. There is evidence for hinking that in some localities Yarrow should also be added this class.

B.—*Those species which, if the commercial seed is not sown, ill make as great or greater contribution to a permanent sward as the seed were included in mixtures.*—This applies to Red Clover when ordinary commercial Cowgrass, Red Clover or Lateowering Red Clover is sown), White Clover (when the ordinary ommercial seed is used), Yellow Suckling Clover, Roughtalked Meadow-grass, Crested Dogstail, and the Fine-leaved escues. It has been shown that the indigenous counterparts f all the above plants, with the exception of Red Clover, may ake a substantial natural appearance on three- to four-year eys. In the case of White Clover, Rough-stalked Meadowrass, the Fine-leaved Fescues and Crested Dogstail, there is trong evidence to support the view that in certain localities he inclusion of the commercial seed in mixtures may actually ecrease the amount of these plants found contributing to the ore adult herbage, say at about six years and upwards, nd especially as the sward becomes older. It is a fact, owever, that Rough-stalked Meadow-grass and Crested Dogstail on the soils that suit them, and the Fine-leaved escues on a few poor sands when included in mixtures, develop uch more rapidly than when not sown, and that consequently he commercial seed, although not giving lasting plants, and eing of no value in the formation of permanent pastures as uch, is sometimes of decided value in the preparation of three- o four-year leys. This is particularly true in the case of Rough-stalked Meadow-grass, which has been shown to be omplementary to Wild White Clover, the two together having decided influence in the suppression of weeds.

C.—*Species which, in the past, have been largely included in Trade" mixtures for the formation of leys and permanent grass ver a wide range of soils, but which either succeed in a few calities only, or which practically never succeed from commercial eed.*

It must be emphasised that the inclusion of the seed of a species has not been justified unless it makes an appreciable contribution to the sward; a few plants scattered over a field is no evidence of success. Meadow Foxtail is the most striking example. It is a grass which would seem never to be a really economic success from sowing; and this is the more unfortunate, since the indigenous variety is one of our most valuable herbage plants, and is one which does not make an early natural appearance on prepared leys. In the past, the failure of Meadow Foxtail could have been attributed to the poorness of the seed; during the last decade, however, excellent samples of the commercial seed with a high capacity for germination have been freely put on the market.

Meadow Fescue, which is still largely used in proprietary mixtures, often to the extent of 4 to 6 lb. per acre, has proved to be as complete a failure as Meadow Foxtail in many, and perhaps the majority of, districts. It succeeds, however, in certain localities, especially on fertile soils. Smooth-stalked Meadow-grass is another species which, from commercial seeding, is but seldom successful, and the same is true of all the commercial varieties of the Fine-leaved Fescues, which but occasionally justify themselves, and apparently only on very poor sands. The aggregate waste of money resulting from the inclusion of these species in mixtures in unsuitable localities must have been very great, and it is to be hoped that they will never again be imported into this country in such large quantities as before the War.

D.—*Species which contribute largely to the herbage during the first year after sowing, and* (*a*) *which continue to gain on the ground, and will attain to maximum development within at least four years, and which, during this period, will always be much more plentiful when included in mixtures than when not sown, and* (*b*) *which attain to maximum development during the first year, and then either completely die out or fall off rapidly.*

This category includes what may be called the pivotal species in the preparation of one-, two-, three-, and four-year leys. Under (*a*) we have such valuable species as Cocksfoot, Timothy, Perennial Rye-grass (on some soils), Tall Oat Grass, Meadow Fescue (on a few soils), Chicory and Commercial White Clover, and under (*b*) the various varieties of Red Clover, Alsike Clover, Trefoil (on some soils), Italian Rye-grass, and on many soils Perennial Rye-grass should be included with these rather than with the plants that last for three or four years.

The Selection of a Seeds Mixture for a Two- or Four-year Ley.—It will be apparent from the above considerations that the number of species of which the commercial seed may be economically employed in the preparation of two-, three- and four-year leys, is not at present considerable. Those species which may be used with confidence are :—

Perennial Rye-grass, Late-flowering Red Clover and Alsike Clover for the first two years ; Cocksfoot and Timothy chiefly for the second, third and fourth years ; and Wild White Clover in conjunction with Rough-stalked Meadow-grass and Crested Dogstail. The object of including the latter is to hasten the formation of a bottom sward, suppress weeds, and ensure a good and leguminous herbage to plough down.

The actual amount of the several species to be used in a mixture will depend upon a number of considerations, which it is beyond the scope of this paper to discuss in any detail.

The following mixture, which has been largely employed in Central Wales, may be given as an example of what may be called a nucleus mixture for a four-year ley, and can easily be modified to meet local requirements :—

Perennial Rye-grass	7 –14 lb. per acre.
Cocksfoot..	6 –12 ,, ,,
Timothy	3 – 5 ,, ,,
Rough-stalked Meadow-grass	1½– 2 ,, ,,
Crested Dog's Tail	1½– 2 ,, ,,
Late-flowering Red Clover	3 – 4 ,, ,,
Alsike Clover	1 ,, ,,
Wild White Clover	½ – 1 ,, ,,

Total minimum seeding to acre, say about 28 to 30 lb., and maximum, even if other species are added, about 35 lb.

In localities where Perennial Rye-grass contributes practically nothing to the second year's sward, excellent results are often obtained by excluding it altogether, and sowing up to 14 lb. Cocksfoot and 6 lb. Timothy. In the few localities where Meadow Fescue succeeds, the Perennial Rye-grass should not exceed about 8 lb., the Cocksfoot may be decreased and 6 lb. of Meadow Fescue added. Chicory, at the rate of 2 lb. to 3 lb. per acre, may be included with advantage, especially where spring grazing for sheep is required. It is sometimes necessary to sow a blend of Broad Red Clover and Late-flowering Red Clover, instead of relying solely on Late-flowering Red Clover, in order to ensure a clover aftermath following the first hay crop. On cold and wet soils it is usually advisable also to add to the amount of Alsike sown up to a maximum of 2½ lb. per acre. In some localities the inclusion of Rough-

stalked Meadow-grass or Crested Dogstail is not justified; it is then advisable to increase the quantity of Wild White Clover. Gilchrist has used the latter seed up to a maximum of 4 lb. per acre.*

A mixture for a two-year ley should not differ very much from that for a four-year ley. The inclusion of Rough-stalked Meadow-grass and Crested Dogstail is unnecessary. English White Clover could often take the place of Wild White Clover, or a blend of the two might be employed, and a blend of Broad Red and of Late-flowering Red Clover should always be used. The Rye-grass sowing should consist in part of Italian Rye-grass. There is evidence to show that it is economical to retain Cocksfoot and Timothy in most mixtures for two years, and on very dry soils the inclusion of Tall Oat Grass is often an advantage. The following mixture, recommended by Finlay† for ordinary average soils, may be given as an example of a nucleus mixture for a two-year ley :—

Perennial Rye-grass	13 lb. per acre.
Italian Rye-grass	5 „ „
Cocksfoot	6 „ „
Timothy	3 „ „
Late-flowering Red Clover	1½ „ „
Broad Red Clover	2 „ „
Wild White Clover..	½ „ „
Commercial White Clover	½ „ „
Alsike Clover	1 „ „

Total seeding per acre say about 32 lb.

The Systematic Production of Grass and Clover Seed in this Country.—The foregoing suggestions as to seeds mixtures have been based on the known behaviour of the commercial seeds as at present available to the farmer. An ideal mixture for a temporary ley should provide a more complex herbage, and rapidly produce a sward more comparable with that of the best permanent grass-lands in the country.‡ Such a mixture would include grasses like Meadow Foxtail and Meadow Fescue, the more succulent of the Fine-leaved Fescues, and strains of Red Clover of considerable permanence. It must not, however, be supposed that because a great number of species do not

* The mixture advocated and successfully employed by Gilchrist is as follows :—16 lb. Perennial Rye-grass, 10 lb. New Zealand Cocksfoot, 4 lb. Timothy, 4 lb. Cowgrass (=Late-flowering Red Clover), and from 1½ to 4 lb. Wild White Clover.

† Finlay, W. M., " Rotation Grass " : *The Scottish Journal of Agriculture*, Vol. I., No. 4.

‡ It has often been noted that artificial grass when put down with a well-

succeed from the sowing of the commercial seed, that these species, as such, are unsuitable for the formation of temporary or permanent pastures. The success of the indigenous counterparts of practically all the species of commerce, when they once make an appearance on a field, and the rapid results obtained from sowing the seed of Wild (indigenous) White Clover, points irresistibly to the conclusion that the seed of our native herbage plants is likely to give far better results than the ordinary seed of commerce, so much of which is imported.

This reasoning should be applied not only to grasses like Meadow Foxtail and Meadow Fescue, which usually give negative results, but also to more successful imported grasses such as Cocksfoot. This is a grass which grows in great luxuriance in hedgerows and waste places, and it is more than probable that seed collected from such plants would bear a similar relationship to the seed imported from Denmark as that of Wild White Clover bears to ordinary White Dutch Clover.

It becomes, therefore, a question whether it is not in the national interest that an intelligent endeavour should be made to build up supplies of the seed of our more important herbage plants. To do this successfully involves scientific inquiry and investigation in the first instance, and in the last resort would demand the hearty co-operation of both farmers and seed merchants, since it would manifestly become necessary to grow stocks of grass and clover seeds on a far larger scale, and with very much more care than has heretofore been the practice in this country. With regard to the collection of seed and working up of stocks, two courses are open, namely, "bulk collection" and "individual collection." Bulk collection would simply entail the harvesting of certain species in bulk from such localities as they were known to grow in great luxuriance, and the subsequent building up of supplies. Individual collection would consist of taking the seed from carefully selected plants and building up improved strains by the methods of selection and hybridisation such as have been applied to cereals and roots in this country and elsewhere, and to herbage plants on the Continent and in America.

The first plan is, of course, that already employed in the case of Wild White Clover, and is one that might be applied to the more bulky plants which grow in large masses together. "Bulk" collection would be likely to be most valuable in the case of such grasses as Cocksfoot, Meadow Foxtail, Tall Oat Grass, Crested Dogstail, Rough-stalked Meadow-grass and

Wild Red Clover. The last three of these are in fact often by-products from Wild White Clover harvests, and can be secured off old permanent grass lands by the reaper. Cocksfoot, Meadow Foxtail and Tall Oat Grass often grow in great masses together—the first on hedges and roadsides and in gorse brakes (*e.g.*, in great luxuriance in Devon and Cornwall); the second on certain rich water meadows and frequently on waste pieces of land about towns, and the third near the edges of woods. The seeds of these grasses could be harvested in considerable amount by hand.

Selection and other scientific methods of improvement should, of course, be applied to the above plants, and also in particular to Perennial Rye-grass, Tall Fescue, the Fine-leaved Fescues and Wild White Clover. Immediate benefits could not, however, be looked for on these lines, since the work would involve the accumulation of a great deal of data as to the sub-species and varieties of our native herbage plants followed up by prolonged and detailed research. An undoubted barrier to the introduction of grass and clover seed production on a large scale in this country is the careless manner in which these seeds are at present grown; little or no care is taken to produce clovers or rye-grasses from carefully selected strains, and in a high state of purity. Rye-grasses grown in the British Isles often contain excessive amounts of Soft Brome and Yorkshire Fog; whilst harvests of Red and White Clovers are frequently ruined by the quantities of Cranesbills, Ribgrass and Campions, and other weeds they contain. It has to be admitted that on the average the purity of British Clovers is far below that of imported stocks.* There would not seem to be much hope for improvement in this direction unless it were possible to found a well-conducted industry for the production of the seeds in question. It would probably also be necessary, if it is desired to encourage the production of the seeds of herbage plants in this country, to institute a system of inspection of growing crops and registration of stocks. The registration of stocks of Wild White Clover has been frequently advocated by competent authorities, and it cannot be denied that there are strong arguments in favour of doing so in the case of the seed of a plant of great value, which cannot readily be distinguished from the ordinary commercial commodity—arguments which

* The following average figures relative to impurity in Red Clovers were obtained at the Seed Testing Station in respect of the samples tested during 1917-18.

English Red Clovers	3·38 per cent.	Chilian Red Clovers	1·23 per cent.
French " "	3·00 " "	Canadian " "	1·41 " "

would apply with equal force to stocks built up from other indigenous plants.

It is beyond the scope of this article to inquire into the means whereby an industry might be established for the production of indigenous grass and clover seeds—whether, for instance, it could be set up on a voluntary and co-operative basis, and whether State intervention would be necessary with reference more particularly to crop inspection and registration of stocks. It is, at all events, much to be desired that any plans that may be initiated by private enterprise in the direction of producing home supplies of the seeds of herbage plants will be laid on thoroughly scientific lines, and that supplies of seeds will only be built up from stocks of proved productivity and hardiness, and preferably from those of *undoubted* native origin.

An investigation, undertaken on behalf of the Food Production Department, is now in progress with a view to collecting accurate information as to the value of indigenous seed. An endeavour is being made to collect supplies of the seed of certain species in order to ascertain the germination capacity of the native seed; to compare the indigenous with the ordinary commercial seed when included in mixtures; and to build up supplies of indigenous seed for the purpose of conducting large scale trials.

LAND SETTLEMENT IN THE MOTHER COUNTRY.

A FURTHER booklet (L.S. 9) under the above title has been issued by the English and Scottish Boards of Agriculture, with the approval of the Admiralty and the War Office, dealing with the question of the settlement of officers on the land after the War. An earlier booklet, which was reproduced in last month's issue of this *Journal*, p. 1152, treated the matter, broadly speaking, from the soldier's point of view The pamphlet now under consideration enters into the question of the opportunities afforded rather to officers (under which term are included warrant officers, non-commissioned officers and men in the ranks, provided they are of suitable educational promise) to adopt agriculture as a means of obtaining a livelihood. The two publications should be read in conjunction, as certain features which appear in both, and were included in the previous *Journal* article, are not reproduced here. In

particular, the references to poultry-keeping, mixed farming, dairy holdings and fruit and market gardening, and advice as to the cost of renting or buying a holding have here been omitted.

TRAINING.—A training scheme for officers who desire to take up agriculture and require financial assistance from the Government for training in England or Wales has been devised on the following lines :—

1. The Government will give a limited number of scholarships (value varying up to £175 per annum and fees, for three years) to be held at an approved university or agricultural college in England or Wales by officers who are selected by the Board of Agriculture and Fisheries for the purpose. These scholarships are intended primarily for candidates who have had either previous experience of farming or a scientific education, or both, and who desire on completion of their training to apply for salaried posts of an educational character such as agricultural organisers, teachers of agriculture, county instructors, etc., or for posts as estate managers, etc. No precise indication can be given of the number or class of such posts which may subsequently be available, but they are likely to be small in number. The salaries range from £200 to £600, as a general rule; but an officer starting in this line of life must, of course, expect to begin at the lowest rate.

2. The scheme just described is not, of course, a scheme of land settlement, or to take up an agricultural occupation such as a farm managership, intended for those who wish to farm on their own account when they have completed their training. For this latter class of officers it is proposed to offer a number of allowances (value £125 per annum for two years) to provide them with two years' residential training with an experienced farmer in England or Wales.

In both the above cases an additional allowance may be made to officers married before the date of the Armistice, 11th November, 1918, at the rate of £24 per annum for each child up to and including the age of 15 years, up to a maximum of £96 per annum.

Any officer who desires to be a candidate for a scholarship under the first part of this scheme, or for an allowance under the second part, should in due course fill up the form (L.S. 9A.)* attached to this booklet, headed "*Agricultural Training for Officers*," and attach it to Army Form Z.15 or Navy Form S.1299 (Civil Employment or Training Form (Officers)) when he receives it.

* Not reproduced here.

If an officer has already completed Army Form Z.15 or Navy Form S.1299 he should obtain another Z.15 or S.1299 Form from the Military or Naval Authorities and fill it up afresh, marking it clearly "Revised application," and attach to it the Agricultural Training Form.

If an officer has already been demobilised or released from the Forces he should apply to the nearest District Directorate—according to his respective place of residence in England or Wales—of the Appointments Department, Ministry of Labour, for an appropriate ex-officer's application form, and attach to it the Agricultural Training Form.

The Training Scheme above described does not apply to Scotland or Ireland, and any officer who desires agricultural training in either of these countries should not, therefore, fill in the Agricultural Training Form (L.S. 9A.), but should simply state on the Z.15, S.1299, or ex-officers' application form that he desires training in Scotland or Ireland, as the case may be.

SETTLEMENT.—As already indicated, officers who have capital and possess or acquire experience will probably find little difficulty in obtaining land through the usual channels and fitting themselves into the general agricultural system of the country, always assuming that they possess the necessary energy and ability to make a success. Those who possess or acquire experience but have insufficient capital will need to take advantage, as a general rule, of the facilities given to take up small holdings. They will, of course, desire to rise through the intermediate stage of the small holder to the position of the farmer, and it is the intention of the Government to provide every facility for that purpose.

Shortly, the openings offered in agriculture to officers desiring to settle on the land but possessing little capital are as follows :—

(1) Small holder with capital adequate for the purpose: Suitable land on reasonable terms with a prospect of making a comfortable living provided he and his family are prepared to work hard.

(2) Small holder with insufficient capital: The same advantages as under (1) with the prospect of an advance by way of loan to assist in purchasing seeds, stock and implements.

(3) Commissioned officers, but as a general rule only those who have risen from the ranks, are eligible for the Small Holding Colonies now being established by the Board of Agriculture, and

it is possible that as an experiment a special colony may be established for officers. These colonies are designed to establish settlers on the land on a communal and co-operative basis either as individual small holders or as members of a community sharing the profits derived from the working of the colony as a large farm. Facilities will be available for hiring machinery, implements, etc., from a central farm, and the colonists will have the benefit of advice and assistance from the Director of the Colony.

Forms of application for holdings on such colonies in England or Wales, and any further [information required, can be obtained from the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W.1. Officers desiring to obtain holdings on colonies in Scotland should apply to the Secretary, Board of Agriculture for Scotland, 29, St. Andrew Square, Edinburgh.

Apart from a holding on a colony any officer who desires to obtain, after demobilisation, a small holding of not more than 50 acres in England or Wales, or of not more than 50 acres or £50 rental value in Scotland, should fill up the appropriate form (L.S. 9B.)* (attached to this booklet), and, if he is a military officer, hand it to the officer commanding his unit for transmission, in the case of England or Wales to the Clerk of the County Council at *the county town of the county in which he desires to settle*, or in the case of Scotland for transmission to the Board of Agriculture for Scotland. *If he is a naval officer he should forward the form* direct. Any officer who so applies for a small holding should attach a statement to Army Form Z.15 or Navy Form S.1299 that he has done so, mentioning the name of the county concerned.

Any officer already demobilised or released from the Forces who desires to obtain a small holding should send the Application Form (L.S. 9B.) direct to the Clerk of the County Council in England or Wales, or to the Board of Agriculture for Scotland, as the case may be.

In order to meet the special cases of officers who have sufficient agricultural experience but have insufficient capital, the Government propose to empower County Councils, or in Scotland the Board of Agriculture for Scotland, to advance to ex-Service tenants by way of loan money to assist in purchasing the necessary stock and implements for the purpose of working their holdings. This proposal is not yet an accomplished fact.

This booklet has been devoted mostly to giving information concerning small holdings and agriculture as an occupation for

* Not reproduced here.

those who can take up only small holdings. The reason is that officers who possess or acquire the necessary training, and *have capital* to the extent of (say) £1,000 or more, have before them the whole range of agriculture as practised in this country, and it would extend this booklet to undue length if an attempt were made to survey in detail the prospects open to men who are able to embark on farming on a fairly extensive scale. General information on this latter topic will, however, be found in a book issued by the Appointments Department of the Ministry of Labour entitled "A Record of Opportunity," which contains information also concerning the facilities for obtaining training and experience by those who do not need financial assistance from the Government for that purpose.

The English and Scottish Boards of Agriculture will be happy to give any advice necessary concerning methods of training and settlement, and to advise officers who wish to know how they should proceed to obtain training and take up land, even if they do not require direct Government assistance in money.

THE *following* Note has been communicated by Dr. Franklin Kidd and Dr Cyril West, of the Imperial College of Science and Technology :—

Increased Yields as the Result of Swelling Seeds in Water.

Much interest has been aroused recently amongst agriculturists as to the possibility of obtaining increased yields from seeds which have been submitted to treatments in which soaking in water or in salt solutions plays a part. It therefore seems appropriate to draw attention to this subject.

Some 40 years ago two German agriculturists of repute, namely, C. Kraus[3] and E. Wollny[5 and 6], showed that increased yields could be obtained by swelling seeds in water.

Their main conclusions may be summarised as follows :—

1. In order to obtain the best results the seeds must be swollen in the minimum amount of water necessary to saturate the seeds thoroughly. (If a large excess of water is used, the effect upon the subsequent growth and yield of the plants may be harmful.)
2. The time of immersion should be sufficiently long for the seeds to become fully swollen.
3. A subsequent redrying of the seed does not appreciably alter the beneficial effect of the treatment, but the redrying must not be carried out too rapidly.
4. The percentage of germination is liable to be slightly decreased by the treatment.
5. Swelling seeds in solutions of nutrient salts has much the same effect upon yield as swelling the seeds in pure water.
6. All the seeds tested (*i.e.*, the chief cereals, and various other annuals of economic importance) gave the same result, with the exception of winter rye.

As the published results obtained by these agriculturists are accessible at only one or two libraries in this country we may profitably record here a few of their figures.

TABLE 1. (after Wollny).

Comparison of Yields from (i.) Seeds Swollen in Water and Sown in the Moist Condition, (ii.) Seeds Swollen and Redried before Sowing, and (iii.) Untreated Seeds.

The seeds were allowed to swell in the least possible amount of water necessary for complete saturation for 36 hours (the maize for 72 hours). The redrying process extended over 14 days, during which time the seeds were left exposed to the sun and air.

Kind of Seed.	Date of Experiment.	Treatment of the Seed.	Number of Plants: Original.	Number of Plants: At the Harvest.	Yield from 100 Plants: Seeds.	Yield from 100 Plants: Straw.	Average Weight of 100 Seeds.	Percentage Increase or Decrease in Yield of Seeds from experimental Plants as compared with that from the Controls.
					gm.	gm.	gm.	
Victoria peas ..	1877	Swollen, sown moist	64	58	**532·9***	1324*	—	+29
		Untreated	64	59	413·3*	1443*	—	
Beans	1877	Swollen, sown moist	64	57	**920·5***	2436*	—	+27
		Untreated	64	60	727·6*	2215*	—	
Victoria peas ..	1878	Swollen, sown moist	100	88	**1188·6**	1778	—	+23
		Untreated	100	94	967·0	1658	—	
" ..	1882	Swollen, redried ..	92	74	**548·6**	1594	—	+ 9
		Untreated	97	76	502·6	1684	—	
Vetch	1882	Swollen, redried ..	90	79	**440·4**	910	—	+ 6
		Untreated	96	82	417·0	1074	—	
Winter rye ..	1882	Swollen, sown moist	100	96	867·0	1510	—	— 6
		Untreated	100	100	**925·0**	1690	—	
Victoria peas ..	1882	Swollen, sown moist	95	84	**602·0**	2012	—	+10
		Untreated	97	90	548·0	1998	—	
Vetch	1882	Swollen, sown moist	89	87	**414·0**	1138	—	+ 7
		Untreated	98	89	388·0	1146	—	
Victoria peas ..	1883	Swollen, sown moist ..	69	62	445·0	1355	—	+16
		Swollen, redried ..	79	71	**511·0**	1408	—	+34
		Untreated	93	83	382·0	952	—	
Beans	1883	Swollen, sown moist	99	99	**869·0**	1545	46·5	+ 9
		Swollen, redried ..	100	96	868·0	1459	45·6	+ 9
		Untreated	99	94	798·0	1468	38·8	
Winter rye ..	1883-4	Swollen, sown moist	99	60	1160·0	1983	2·99	— 8
		Swollen, redried ..	95	83	1101·0	1831	3·17	—13
		Untreated	93	70	**1263·0**	2314	3·14	
Summer rye ..	1884	Swollen, sown moist	94	80	497·0	975	2·75	+ 5
		Swollen, redried ..	85	53	**559·0**	1302	2·38	+18
		Untreated	89	78	475·0	1051	2·57	
Maize	1884	Swollen, sown moist	27	27	12515·0	46740	38·9	+11
		Swollen, redried ..	27	26	**14792·0**	47577	36·1	+31
		Untreated	27	27	11274·0	41630	36·4	
Victoria peas ..	1884	Swollen, sown moist	96	92	**730·0**	1282	27·9	+ 9
		Swollen, redried ..	92	87	705·0	1310	29·4	+ 6
		Untreated	94	87	668·0	1184	28·7	
Beans	1884	Swollen, sown moist	95	77	381·0	766	47·2	+ 3
		Swollen, redried ..	95	82	**402·0**	792	51·0	+ 9
		Untreated	94	80	369·0	725	47·7	

* Yield from 64 plants.

TABLE II. (after Wollny).

The Harmful Effect of Soaking Seeds in Excess of Water.

In these experiments the volume of water used was ten times that of the seed

Kind of Seed.	Treatment of the Seed.	Number of Plants at the Harvest.	Yield from 100 Plants: Seeds.	Yield from 100 Plants: Straw.	Average Weight of 100 Seeds.
			gm.	gm.	gm.
Summer rye ..	Untreated ..	78	**475**	1051	25·7
	Soaked ..	65	359 (—24%)	877	22·7
Peas	Untreated ..	87	**668**	1184	28·7
	Soaked ..	84	546 (—18%)	1214	27·5
Beans	Untreated ..	80	**369**	725	47·7
	Soaked ..	77	264 (—28%)	766	54·4

From a careful analysis of the growth of the plants at various stages of development, conclusions were drawn as

to the reason for the increased yields obtained. The plants from the treated seeds grew more quickly in the first few weeks, came into flower earlier, flowered for a longer period, and ripened off more slowly than the plants from the untreated seeds.

Schleh[4] and Eberhart[1] have later claimed to have demonstrated that the swelling of seeds before sowing will increase the crop yield. The following table gives one set of results obtained by Eberhart in a field experiment with beans.

TABLE III. (after Eberhart).

Comparison of Yield from (i.) Seeds Swollen in Water and Sown in the Moist Condition, (ii.) Seeds Swollen and afterwards Redried, and (iii.) Untreated Seeds.

Harvest Results.

—	Number of Plants.*	Weight of Pods.	Weight of Straw.	Average Length of the Stem.	Average Number of Pods per Plant.	Weight of Seeds.
		gm.	gm.	cm.		gm.
Untreated Seeds ..	96	609·0	776·0	97·75	4·19	474·3
Seeds swollen in water previous to sowing ..	96·6	697·8	877·6	103·02	5·08	548·8 (+15%)
Seeds swollen in water and redried before sowing	95·3	677·1	875·6	101·74	5·03	526·3 (+11%)

* Mean of three experiments.

The work referred to above indicates that a definite increase in yield may be obtained by swelling the seed in water. It is clear that the water factor must be taken into account in the consideration of any process for increasing crop production which involves soaking the seed.

Elsewhere[2] the literature dealing with this water factor is critically reviewed, and also that dealing with the effect upon yield of the environmental conditions of the seed before harvesting, during storage, before sowing, and at the time of germination.

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THE EARLY ELIMINATION OF SURPLUS COCKERELS.

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THOSE who rear large numbers of pullets for egg-production are faced with the problem of the disposal of their cockerels to the best advantage, for, with many of the best egg-laying breeds, it is not possible to distinguish the sexes with certainty until the birds are several weeks old; and in some breeds such as Wyandottes and Rhode Island Reds the period is even longer than in the Mediterranean races. Under present conditions the rearing of young birds is expensive, especially during the earlier stages, nor is the rearing of cockerels in large numbers an economical source of flesh in view of the shortage of feeding stuffs. If, therefore, some way were found by which the sexes of the chicks could be distinguished with certainty at hatching, and the cockerels at once killed off, the cost of rearing the pullets necessary for egg-production would be materially reduced.

It does not appear to be generally known that, in some breeds, *provided that suitable matings are made,* the sexes of the chicks can be readily distinguished on hatching. This depends upon the fact that certain colours and patterns which are already betokened in the down are transmitted by the hen to her male offspring only. As an example may be taken the case of the Barred Plymouth Rock. Barred plumage is dominant to self-black; barred birds can throw blacks, but blacks bred together cannot give barred offspring. Now it is a peculiarity of the barred hen, no matter how bred or to what strain she belongs, to transmit the barred character to her male offspring

only. This can be readily observed by mating her with a self-black cock. In such a case all her sons are barred, but all her daughters are black. Chicks which will develop into barred birds can be distinguished in the down from those which become black. The latter have the down of a typical black breed, *i.e.*, they are full black except on the ventral surface, where they show a varying amount of white marking. The down colour of barred birds is, however, rather less intense as regards the black, while at the same time it shows a light patch at the back of the head, and frequently a lighter patch on either side of the rump (*cf.* Figure). The head patch is a certain guide and which may be relied upon to distinguish, at hatching, such birds as will become barred from those

Figure illustrating the difference in down colour between a chick that will grow into a bird with self-black plumage (on left) and one that will feather into a barred plumaged bird (on right). From the mating Barred Hen and Black Cock the former are all pullets, while the latter are cockerels.

that will develop into self-blacks. If, therefore, barred Plymouth Rock hens are run with black cocks the male ffspring, which will all be barred, and will show the head spot 'he down, can be separated from the females, which are all

black at hatching. By killing off the barred chicks the breeder need rear nothing but pullets, and so avoid the expense of raising a number of surplus cockerels.

But, of course, all the hens so produced are black, and cannot be used directly in matings to give barred cockerels and black pullets only. While this form of mating can be used to obtain the bulk of the pullets required for egg-production, the supply of barred hens for breeding must be maintained by means of one or more pens of the barred strains, according to the size of the establishment. In these, of course, it will not be possible to tell the sexes apart at hatching, and the cockerels must be reared to the stage at which sex manifests itself by other characteristics than the colour of the down. As, however, a relatively small proportion of the pullets bred for egg-production is subsequently used for breeding purposes, the method of eliminating surplus cockerels in the way outlined above should result in a very considerable saving of the expense now incurred through rearing large numbers of cockerels which are not required.

The provision of the few black cockerels offers no difficulty since blacks bred together give nothing but blacks. A single pen would provide all that were needed, and, as the pullets would naturally be reared for egg-production, there will be no wastage through killing.

The saving effected by taking advantage of the sex difference in down colour, where the dominant barred hen is mated with the self-black cock, may be illustrated by a numerical example. Let us suppose that the egg producer aims at rearing 1,000 laying pullets annually. In the ordinary way this means that 2,000 birds must be reared, since the sexes are produced in approximately equal numbers. Of the 1,000 cockerels the great bulk will be surplus birds, an unavoidable incubus on pullet production as present methods go. To produce these 2,000 chicks we may suppose that 50 hens are used as breeding stock, reckoning each hen to give 40 chicks (20 males and 20 females) during the hatching season.

On the method suggested above, these 2,000 birds will be produced from 50 barred hens run with a few black cockerels. The 1,000 male chicks, betrayed by their down colour, would be killed at hatching, and only the 1,000 black pullets reared for egg-laying. This entails the production of 50 barred hens annually for breeding. These should easily be reared from a single pen of pure barred birds, a cockerel and, say, four hens. The rearing of these 50 pullets would entail the rearing of a

corresponding 50 cockerels. The net result, however, would be the production of 1,050 pullets and 50 cockerels in place of 2,000 birds (1,000 of each sex) by the method at present in vogue. The breeding of the few black cockerels required for mating hardly enters into the question, since a single pair of blacks would give all that were wanted.

The case of the barred Rock has been given as a typical example, but the breeder who wishes to apply this method is not necessarily tied down to the use of this particular breed. The same type of inheritance is also exhibited in the characters of silver ground-colour as opposed to gold. Many breeds exist in which silver has its counterpart in gold—such examples are Silver and Gold-pencilled Hamburgs, Silver and Gold-laced Wyandottes, etc. In all of these cases silver behaves as a simple dominant to gold, and in all the silver hen transmits silver to her sons aud gold to her daughters, just as the Plymouth Rock transmits barring to her sons and self-black to her daughters. Here, again, the colour of the bird is already betokened in the down. The down colours of the various gold and silver breeds show much variation. They may be pale with a few markings, as in the pencilled Hamburg, or much darker as in the laced breeds. Generally speaking, however, the silvers and golds are perfectly distinct in the down, and with very little practice they may be sorted out with certainty at the time of hatching. Such breeds may be used in the way outlined above, silver hens being, in this case, mated with a gold cock. The cocks from such pens will be all silver and the hens all gold. Apart from this difference the further procedure would be just as in the case of the Barred Rocks.

The silver-gold feature is also found in breeds where the predominant ground colour is neither silver nor gold. Silver-greys, such as Light Dorkings, behave towards Brown-reds, such as Brown Leghorns, in the same way that silvers behave towards golds. Mated with a brown cock the silver-grey hen gives chicks with two types of down, viz., the ordinary brown striped form and the silver grey form. In the former, the ground colour is yellowish buff and the stripes are a rich, warm brown ; in the latter, the ground colour is paler and the brown stripes are distinctly lighter in shade. The brown-striped chicks are the pullets, the silver-greys the cockerels. Since striping in the down is dominant to some of the down colours of gold breeds, the difference between the sexes at hatching is equally well marked when a silver-grey hen is mated with a

cock of certain of the gold varieties. A cross well worthy of attention is that between silver-grey hens and a Rhode Island Red Cock.

Breeders of pullets for laying will probably raise the objection that the best egg-producing strains do not lend themselves to the system of mating suggested above. This is perfectly true in the case of some of the most popular breeds used for egg-production to-day. The method cannnot be used for pure white or pure black races. Such breeds as White Leghorns, White Wyandottes, and Black Leghorns, must at present be ruled out. Nevertheless, there can be little doubt that if more attention were given to the breeds where the necessary sexual distinctions occur, strains could readily be evolved which would compare favourably with the best strains of egg-producers now in existence. There is no reason why the Gold and Silver Wyandottes should not be made as good as the Whites, and the work of the Maine Station in America has shown what can be done with the Barred Rock.

Moreover, the breeder is not entirely debarred from using certain of the perfected egg-producing varieties. Rhode Island Red cocks may be used for producing pullets either from hens of silver-greys or any of the silver breeds, *e.g.*, Silver-laced or Columbian Wyandottes. Barred Rock hens again may be mated with a Black Leghorn cockerel. This point is of considerable importance, for, as is now well known, the father is of greater influence than the mother in transmitting the quality of high egg-production to pullets. Provided that the Black Leghorn cockerel belonged to a first-class laying strain, it is likely that his daughters bred from the best Barred Rock hens would prove nearly, if not quite, as good layers as the pullets of his own pure strain.

The same would probably hold good for the first-class pullets bred from Columbian Wyandottes mated with a Rhode Island or a Brown Leghorn cock. Even if a slight decrease in the output of eggs had to be faced, and this is by no means certain until the point has been definitely tested, the breeder making use of the system outlined above would in all likelihood be more than compensated by being able to eliminate his cockerel chicks on hatching. At the same time, from the national as well as from the private standpoint, a considerable saving would be effected in high-grade foodstuffs at a time when these are scarce and difficult to procure.

Notes on Poultry-keeping.

The Food Problem.—With the gradual improvement in the prospect of food supplies, not only in increased supplies which may be looked for with the release of a larger proportion of millers' offals and the probability of imports of cattle feeding stuffs, but also in quality due to changes in milling, the outlook for poultry-keepers is more encouraging. Severe weather and consequent large demand for animal feeding stuffs may be expected for several months, and a return to pre-war conditions cannot be expected for a very long period. If the lessons of the War have been properly learnt there will be much to compensate the poultry-keeper for the difficult times through which he has passed.

It has been a revelation to many experienced feeders to find how productive a hen can be upon food which in the past has been regarded as of little value. Formerly far more concentrated foods were used; vegetables took little part in the rations served in many yards; a number of valuable by-products have been discovered and are now eagerly sought; and animal food, chiefly in the form of fish meal, is much more generally used. Grain feeding has also been reduced, necessarily, but with advantage, particularly so upon farms, where the quantity given has been more carefully regulated. If the farmer will only realise that the hen as well as the goose—though to a less extent—is a natural feeder, his poultry will give a better account of themselves. His errors have very largely consisted in overstocking the yard in the past and wrong methods of feeding.

Timber Shortage.—An increase in the numbers of poultry kept is to be anticipated, although this will, to a certain extent, be checked by the high cost of poultry houses, and any immediate improvement in this direction is hardly to be expected. This affects more particularly the ordinary farmer and the poultry farmer, since the small poultry-keeper in a sheltered garden overcomes the timber shortage if he is practical and handy. The heavy expense of portable poultry houses suitable for farmers is greatly to be regretted, since this method of keeping fowls is one to be fostered and encouraged in the interests of economical production. Better methods of housing have certainly found more advocates, with a realisation that for eggs all the year round, good shelter and cleanly surroundings are necessary and justifiable.

Prolific Laying Hens.—Probably the most noticeable improvement has been the raising of better-class stock. This has

undoubtedly received far more attention in recent years, the reputation of certain strains and breeds, and the evidence of good results obtained by individuals having spread in all directions. Without detracting in any way from the merits of these strains, it being very evident that great credit is due to the breeders in producing more prolific birds, it should be pointed out that good conditions are an essential factor in the increased prolificacy.

The Selection of Stock.—A further lesson which should lead to great economy if carried out in a practical manner is the recognition of the capacity for production by the hen in her 2nd, 3rd or even 4th year. For many years it has been the general recommendation to dispose of layers at the conclusion of their 2nd season, and there were many advocates of keeping the birds only one complete laying year. There can and should be no definite rule for all classes of poultry-keepers. With a large head of stock the rearing of big numbers of pullets each year is very costly, and although there are definite indications of improvements in the methods of rearing upon a large scale, the skilled poultryman can select hens worthy of retention and likely to result in a better profit. While some men possess the gift for selecting, long experience and familiarity with the birds and their habits are generally necessary to enable the selection to be made, there being no definite guide as a short cut for the novice.

The interest which is now being taken in what is known as the Hogan system of selection is likely to produce useful results, although much closer investigation is necessary before definite conclusions for general information can be arrived at. In the meantime there is danger of misleading the amateur by premature statements.

The retention of hens into their 2nd and 3rd seasons by the small, backyard poultry-keeper, whose birds are kept under intensive conditions, has less to recommend it, for under such conditions the birds are bound to lose vigour more rapidly, while the older birds are often spiteful to the pullets when kept together, and anything upsetting peaceful conditions has a distinct effect in retarding production. It is found a better plan with small flocks to keep hens and pullets in separate pens where possible.

Unity in the Interests of Increased Production.—The proposal for unity amongst the leading poultry societies should, if carried out, have useful results, and should it succeed in overcoming the difficulty caused by the conflicting interests

of the fancier and the utilitarian, a great step will have been made in the establishment of the industry. The whole question needs to be approached with a broad mind. No drastic measures are necessary, but a gradual drawing together of the two interests would eventually lead to great benefit to both sections. Although the membership of the clubs and societies is largely composed of specialist poultry-keepers, there is little doubt that, even if it were not to the individual interest of the members, recent experiences and difficulties occasioned by the War will lead them to take wider views in the national interests for increasing production.

The formation of local clubs, the revival of small shows, and the establishing of classes at these for the encouragement of the utility side, will do much in increasing production amongst farmers and small poultry-keepers—it is on these classes, in combination with the stimulus and assistance given to the industry by the specialist utility breeders, that increased production upon the most economical lines in the future depends.

Evidence of the Value of Sowing Oats Early to Avoid Frit Attacks.

IT is a recognised fact in agriculture that it is necessary to sow oats early to obtain a good crop, the usual reasons given being that early-sown oats are much less liable to be damaged by early summer droughts, and, having a longer time available for growth, they yield more abundant grain. It has also been recognised that in districts where Frit Fly is a pest, early sowing will enable a crop to avoid a serious attack.

As very little experimental evidence in support of the latter fact has ever been published, a short account of some preliminary experiments (part of a series of Frit Fly investigations undertaken by the Food Production Department) on the effect of late sowing as compared with moderately early sowing is of considerable interest.

The recently revised edition of Leaflet No. 202 on the Frit Fly* should be referred to for a full account of the nature of the damage to oats by this pest. It is only necessary to point out here that there are two main attacks on the oat plant, the first on the young plant—an attack which is often confused with "eelworm" damage—and the second on the grain in the ear.

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* *Copies may be obtained on application to the offices of the Board,* [illegible]

This second attack on the grain is undoubtedly more widespread and serious than has been usually recognised. It is not uncommon to find 10 to 20 per cent. of the grain ruined by Frit attacks,* while cases where as much as 40 per cent. has been found to be destroyed are not unknown. Even in the past season, when Frit attacks on the young plants were conspicuously absent, there is reason to believe that the average loss of sound grain throughout the country was in the neighbourhood of 8 per cent.

In the experiments mentioned above, White "Abundance" and Black "Tartarian" oats were separately sown on one-half of a field at Long Sutton in Hampshire on 18th March, the other half being sown with similar oats on 25th April.

Attack on the Young Plant.—On 9th June, when the Frit attack on the young plants was very obvious, the infestation on the early-sown plots was found to be fairly heavy but chiefly confined to the lateral tillers. On the late-sown plots the infestation was very heavy, varying from 80 to 100 per cent. of the plants. On an average the number of plants infested by Frit Fly on the late-sown plots was about five times the number on the early-sown plots, and it was obvious that in the former many plants had been killed outright or so damaged that they would not produce ears.

The Attack on the Grain.—The results of an examination of samples of the grain collected at harvest may be tabulated as follows :—

White Abundance.					Black Tartarian.				
Sowing.	Grains exam'd.	Per cent. sound.	Per cent. fritted.	Per cent. sterile.	Sowing.	Grains exam'd.	Per cent. sound.	Per cent. fritted.	Per cent. sterile.
First ..	2,282	90	5·4	4·6	First ..	3,217	90·5	4·1	5·4
Second..	2,463	72·4	17·8	9·8	Second	2,879	72·4	16·7	11·0

In regard to this Table it may be explained that Frit attacks result either in an apparent failure of the grain to develop or in complete or partial destruction of the grain. Only such grains as exhibited undoubted signs of Frit damage (such as the presence of the empty puparium) were included under the heading "fritted." Doubtful cases where the grain was not developed, but where no obvious signs of Frit damage could be found, were included under the heading "sterile." The increase of these so-called "sterile" grains in the late-sown

* Investigations made independently by Mr. A. Roebuck, of the Harper Adams Agricultural College, Newport, Salop, confirm the truth of this statement.

oats, where undoubted "fritted" grains were more nume leads one to the conclusion that the increased "sterility" also largely due to Frit. In any case the reduction of s grain in the late-sown oats amounted to no less than a 18 per cent., while in addition the crop was obviously "thin due to the previously-mentioned destruction of the y plants. The total loss to the late-sown crop by Frit Fly to the two attacks must have been not less than 30 per c or nearly one-third.

If, therefore, as these experiments have demonstrated early sowing of oats is not only a safeguard against a Frit a on the young plants but also against the equally serious sequent attack on the ripening grain, every effort shou made to have oats sown as early as the condition of the gr and the supply of labour will permit.

The Quality of Farm and Garden Seeds.

THE following brief notes, based on upwards of 10,000 conducted at the Official Seed Testing Station at the Production Department of the I since 1st August last, are published v view to giving growers some inform as to the quality of the farm and garden seeds that w available for the current season.

Cereals.—*Wheat.*—The average germination was good, much above the standard (90 per cent.) specified in the T of Seeds Order. Twenty-five samples out of upwards of however, germinated below 70 per cent., a large number of being badly sprouted and in very poor condition. The striking feature in connection with the wheat samples wa fact that 118, or nearly 4 per cent., contained Ear Cockles to the eelworm (*Tylenchus scandens*). The western co and Wales would seem to have been chiefly affected, sa from Devon, Hereford, Wiltshire and Somerset most frequ containing Ear Cockles, whilst cockled samples were received from Cornwall. Hampshire, Surrey, Kent and S were southern counties, and Worcestershire, Shrop Northamptonshire and Oxfordshire, midland counties aff Yorkshire, Lancashire and Derbyshire were the only no counties from which samples containing Ear Cockles received. One sample from Berkshire and one from were also contaminated.

* See this *Journal*, October, 1918, p. 850.

Over 5 per cent. of the samples contained actual Bunts (due to the fungus *Tilletia tritici*)* and 9 samples contained Ergots (due to the fungus *Claviceps purpurea*).

Barley.—The great majority of the barley samples germinated above the standard (90 per cent.); 7 per cent., however, failed to reach a germination of 70 per cent.

Rye.—The average germination was good, comparatively few samples failing to reach 80 per cent.; 4 per cent. of the samples, however, germinated less than 70 per cent. Slightly over 10 per cent. of the samples contained Ergots. The chief counties from which ergoted samples were received were Yorkshire, Lancashire and Monmouthshire.

Oats.—Most of the oat samples germinated considerably in excess of 85 per cent. About 1·5 per cent. germinated below 70 per cent. An appreciable proportion of the oats, however, was heated in the stack, or otherwise damaged, and several germinated less than 15 per cent.

It is evident from the foregoing facts that, although on the average the germination of cereals is good, considerable care should be exercised in the selection of seed, since it is usually impossible to determine with certainty by inspection whether grain has been rendered worthless for seed purposes as the result of weathering or heating. This applies with particular force to oats. Several apparently useful samples of seed oats have been rejected and used for feeding as the result of reports sent out from the Station.

Roots, Green Crops and Vegetables.—The average germination given by these seeds this and last season, and the standards of germination specified in the Testing of Seeds Order are set out in the Table on p. 1330. The percentage number of samples which have reached or exceeded the several standards and the number of samples on which the average figures for this season are based, are also shown.

It will be noted that the germination of mangolds and peas is decidedly lower than last season, and that the germination of English peas in particular is very poor.

Beet, carrot, parsnip, and vetches or tares are all of decidedly higher quality than last season, and the evidence suggests that English-grown onions are also of higher quality. It should be realised that the standards of germination specified in the Testing of Seeds Order are not high, and consequently whe

* It is proposed to make a microscopical examination of all the whe amples for the spores of Bunt, and a detailed account of the incidence of tl ungus will be given in the Annual Report. See Leaflet No. 92.

seeds below these standards are employed, growers would be well advised to have tests made before placing reliance on the seed. This applies in particular to samples of beans and peas, which frequently are not capable of growth in the soil in proportion to their capacity of germination. These seeds are, moreover, usually sown in proportion to the "plant" required, the rows not being subsequently thinned; it will be necessary, therefore, to add considerably to the seeding when inferior samples are employed.

Table to show the Quality of Roots, Green Crops, and Vegetables.

Kind of Seed.	Standard of Germination specified in the Testing of Seeds Order.	Percentage No. of Samples which have attained to or exceeded the Standard	Germination per cent.		No. of Samples upon which 1918-1919 Averages are based.
			Season 1918-19.	Season 1917-18.	
	Per cent.				
Mangold	120	69	130	138	80
Beet	100	80	120	84	117
Turnip (garden)	80	76 (over 85%)	89	84	116
" (field)	85				
Swede	85	67	87	80	100
Rape	85	63	88	90	11
Kohl Rabi (field and garden)	75	83	86	66	12
Field kale	75	82	85	71	11
Garden kale	75	83	79	71	24
Garden cabbage	75	65	78	73	200
Broccoli	75	62	78	—	73
Cauliflower	70	90	79	—	52
Brussels sprout	75	80	84	—	46
Pea (all samples) ..	75	74	77	86	370
English Pea	75	43	68	—	83
Field bean	—	—	99	97	80
Broad bean	80	95	95	93	43
Dwarf bean	80	79	87	63	48
Scarlet runner bean ..	65	81	82	80	70
Onion (all samples) ..	65	82	73	79	316
English onion	65	75	73	57*	24
Carrot	60	74	69	63	108
Parsnip	50	83	66	45	77
Vetch	90	74	92	78	183

* Four samples only.

The figures given in the Table indicate that in the case of the majority of species, the seed that will be available will germinate in excess of the standards. It should be realised, however, that as a rule dwarf French beans and scarlet runner beans do not germinate so well as broad beans, and that turnip, swede, rape and Brussels sprouts are likely to germinate better than cabbage, broccoli, garden kale and cauliflower.

Grasses and Clovers.—The subjoined Table gives the average germination of the grass and clover seeds tested this season compared with the figures obtained during 1917–1918. Particulars are also given as to the purity of the samples.

Table to show the Quality of Grasses and Clovers.

Kind of Seed.	No. of Samples upon which the 1918-1919 Averages are Based.	Percentage Germination and Hard Seed in the case of the Clovers. 1918-19. g.	1918-19. Hard Seed.	1917-18. g.	1917-18. Hard Seed.	Percentage Purity. 18-19.	Percentage Purity. 17-18.	Percentage of Samples containing over 1 per Cent. Injurious Weed Seeds. 18-19.	Injurious Weed Seeds. 17-18.	Percentage of Samples containing Dodder. 18-19.	Dodder. 17-18.
Red clover (all samples) ..	322	80	5	67	4	96·3	96·6	2	†	29	27
Red clover—											
England ..	55	65	3	61	4	—	—	—	—	30	24
France ..	73	90	3	87	3	—	—	—	—	25	19
Italy ..	39	88	6	—	—	—	—	—	—	13	—
Chile ..	31	86	10	90	7	—	—	—	—	97	82
Canada and U.S.A. ..	20	89	7	89	7	—	—	—	—	20	30
Alsike clover ..	87	82	8	75	8	96·5	95·5	1	3‡	0	†
White clover ..	50	76	9	72	8	92·0	91·1	50	17‡	4	†
Wild white clover ..	21	69	16	64	15	78·0	83·9	5	70‡	0	0
Trefoil ..	124	74	2	64	2	98·3	98·9	†	0	0	0
Lucerne ..	22	85	7	85	6	98·0	98·0	0	0	9	7
Crimson clover	88	89	*	81	*	95·5	97·9	14	0	0	†
Sainfoin ..	—	—	*	53	*	—	98·0	—	0	—	0
Perennial rye-grass ..	100	—	82	77	—	98·4	97·8	38	51	—	—
Italian rye-grass ..	100	—	79	76	—	98·5	98·9	43	33	—	—
Cocksfoot ..	60	—	77	63	—	97·8	93·4	7	6	—	—
Timothy ..	39	—	89	85	—	98·7	98·3	3	1	—	—
Meadow fescue	20	—	83	57	—	98·2	96·8	50	23	—	—
Crested dogs-tail	14	—	71	66	—	98·6	98·0	0	6	—	—

* Less than 1 per cent. † 1 per cent. or under.

‡ *Yellow suckling clover was included amongst the injurious weed seeds in 1917-1918, and it was excluded in 1918-1919, when the soft cranesbills were added.*

It would appear from the above figures that the germination of grasses and clovers is likely to be better than last season. This is markedly so in the case of meadow fescue and cocksfoot, and would seem to be true also of alsike clover and trefoil. The quality of English red clovers is seen to be very similar to that of last year, and the standard of germination of these will in most cases again be low. The occurrence of dodder is as high as last year, and injurious weed seeds present above 1 per cent. are again plentiful in alsike and white clovers and in the rye-grasses; this season such weeds seem to be more than usually plentiful in meadow fescue. It is interesting to note that injurious weed seeds are this year more frequent in Italian than in perennial rye-grass.

It may be emphasised, in conclusion, that the samples so far tested indicate that special care should be exercised during the current season in the selection of seeds of the following plants in particular: oats, mangolds, cabbage, broccoli, peas, scarlet runner and dwarf French beans, English red clover,

trefoil, sainfoin, the rye-grasses (especially in regard to purity), alsike and white clover (especially in regard to purity).

Farmers, allotment holders and others desiring to send seeds to the Station to be tested should comply with the following regulations :—

1. *The Weight of Seed sent must be as follows* :—Broad beans and scarlet runner beans, 8 oz.; peas and dwarf French beans, 6 oz.; wheat, barley oats, rye, vetches, red clover, crimson clover, trefoil, lucerne, and sainfoin, 4 oz.; all grasses, alsike clover, white clover, all roots, beet and mangold, 2 oz.; all vegetable seeds other than beet and mangold, ½ oz.

2. *Fees must be sent at the same time as the Sample.*—The fees are as follows: (*a*) In the case of tests which a farmer requires for his own information only, 3*d.* per sample; (*b*) in the case of tests needed for the purpose of a declaration for sale, 1*s.* per sample for cereals, 1*s.* 6*d.* per sample for roots, vegetables and vetches, and 2*s.* per sample for grasses, clovers, mangolds and beet. Postage need not be prepaid when packages are properly addressed and sent by letter post.

3. Packages should be addressed to *The Director-General, Food Production Department,* 72, *Victoria Street, London, S.W.* 1, and marked "*Seed Testing Station*" in the left-hand top corner of the envelope.

4. Special envelopes may be obtained free of cost on application to the above address.

THE USE OF AMMONIUM NITRATE AS A FERTILISER.

E. J. Russell, F.R.S., D.Sc.,

Director of the Rothamsted Experimental Station.

The cessation of hostilities has enabled the Ministry of Munitions to liberate large quantities of ammonium nitrate for purposes of agriculture, and as this possibility had been foreseen for some time the Rothamsted Experimental Station has been engaged in field trials and other investigations to discover what value the material possessed as a fertiliser. These experiments form part of the campaign organised at

the Food Production Department to seek new sources of manures and to remedy as far as possible the shortage created by war conditions. The material was placed at the disposal of the Station by the Ministry of Munitions.

The experiments were made on potatoes, mangolds and wheat. The results were successful, and show that ammonium nitrate is a very useful fertiliser. For mangolds it was more effective than sulphate of ammonia when reckoned on an equal nitrogen basis, probably because part of its nitrogen is already in the form of nitrate; for wheat it is equally effective. For potatoes, however, it is more risky than sulphate of ammonia: it gave as large a crop, but induced the formation of a large growth of haulm which might easily have been a disadvantage had there been much blight.

Ammonium Nitrate is Concentrated.—Ammonium nitrate is by far the most concentrated nitrogenous fertiliser on the market. When pure it contains 35 per cent. of nitrogen, equivalent to 42½ per cent. of ammonia. Half of the nitrogen is in the form of nitrate which is immediately available for the needs of the crop, and the other half in the form of ammonia which comes into action somewhat later. Samples examined at Rothamsted have been about 96 per cent. pure, the remainder being mainly moisture: in this case the nitrogen content is 33½ per cent. Sulphate of ammonia contains 20 per cent. and nitrate of soda 15 per cent. If sulphate of ammonia is obtainable at £16 15*s*. per ton and nitrate of soda at £20 per ton, then nitrate of ammonia on the same scale is worth £37 5s. per ton. Its richness in nitrogen renders it especially valuable in horticultural and market-garden work. Further, as it is already in the form of nitrate it has no exhausting effect on the lime in the soil, so that it can be used where lime is rather short, and where, therefore, there may be some fear that sulphate of ammonia would not be wholly suitable. It is also entirely suitable for general farm crops and is perhaps the quickest-acting top-dressing known, being even more soluble than sodium nitrate, and, at the same time, as part of its nitrogen is in the form of ammonia, it is *not* so liable to loss if wet weather sets in after it has been applied to the soil.

Absorption of Moisture.—Like some other very soluble substances, ammonium nitrate is liable to attract moisture from the air, and some samples become unmanageable because they form a tough cake which cannot easily be broken and may become pasty. There are, however, several varieties or

modifications of ammonium nitrate, and one of them is free from this objectionable property. It will be necessary for the dealers to ensure that they purchase only the "non-deliquescent" variety, and in case of any uncertainty to communicate with the Food Production Department, who can go into the question with the proper persons. This "non-deliquescent" variety keeps quite well in a dry shed: some of it has been stored in the manure shed at the Rothamsted farm, with the lid of the cask open, for the past ten months without becoming in the least unmanageable. A slight cake had formed on the surface, but it was easily powdered, and the crystals below were in good condition for drilling.

Use in Mixtures.—The proper use of ammonium nitrate is as a top-dressing, and hence it would generally be applied alone. It mixes quite well with superphosphate, and the mixture is easily drilled. The mixture, however, should not be kept, as it may cause trouble, and in any case the superphosphate must be dry and in good condition as supplied by a first-class maker. *A damp superphosphate containing acid should never be mixed with ammonium nitrate, nor should dissolved bones*: in these cases brown fumes are likely to be given off, which may have serious or even fatal effects on persons standing near.

Scorching of Foliage.—Owing to its high solubility, ammonium nitrate is liable to scorch the young leaves of plants. A crop of mangolds was injured in this way in 1914 at Rothamsted: the small crystals falling on the leaves yielded so strong a solution that the plant suffered considerably. In the past season the material was applied in a fine interval during showery weather, with the result that it was speedily washed off the leaves and caused no damage at any time. In experiments in the north no bad effects were observed. This point requires attention from the farmer, but with reasonable care the difficulty about scorching is easily overcome.

Inflammability of Storage Casks, etc.—It is necessary to warn farmers and merchants that bags, casks, etc., soaked in ammonium nitrate become very inflammable and must be kept away from fire. Although ammonium nitrate will not itself burn, it greatly helps anything that is already alight; once a fire started in a store where any large amount was present the effects would be disastrous.

Possible Poisonous Effects.—Some of the ammonium nitrate that will become available has been mixed with T.N.T., and

although this substance has been separated, a little may yet remain behind. So long as less than 1 per cent. is present no harm need be feared: there might, however, be trouble if larger amounts were present, as T.N.T. is poisonous to plants. One sample contained as much as 3 per cent. and yet gave no trouble.

Results of Experiments.—The general results of the Rothamsted experiments may be summarised as follows:—

1. Ammonium nitrate is an excellent fertiliser, the nitrogen of which is worth as much as that in nitrate of soda and sulphate of ammonia. At present prices of these two fertilisers ammonium nitrate would, on the same basis, be worth £37 5*s.* per ton.

2. It contains more than twice as much nitrogen as nitrate of soda, and one and three-quarters times as much as sulphate of ammonia: it is thus the most concentrated nitrogen fertiliser obtainable on the large scale. Where 1 cwt. of nitrate of soda or ¾ cwt. of sulphate of ammonia is ordinarily used, less than ½ cwt. of nitrate of ammonia would be required.

3. It can be applied to any crop for which nitrate of soda is suitable, but it is not superior to sulphate of ammonia for potatoes, and may be inferior. Its proper use is as a top-dressing, and not as a constituent in mixed manures.

4. Farmers must insist on having the "non-deliquescent" variety, otherwise they will certainly be inviting trouble.

5. While the material itself is not inflammable, it yet helps a fire considerably. Great care is, therefore, necessary not to store under conditions where a fire might be started.

The details of the Rothamsted field experiments are set out below.

Experiment on Mangolds.— This experiment was carried out in Stackyard Field: the variety grown was Sutton's "Yellow Globe." Seed was sown on 29th May, 1918: there were six plots, each of $\frac{1}{20}$ acre.

In December, 1917, all the plots had received dung at the rate of 10 tons per acre. At the time of drilling they all received superphosphate at the rate of 4 cwt. per acre, and salt

and sulphate of ammonia at the rate of 2 cwt. per acre. Two received no further dressing; two received nitrate of ammonia at the rate of 145 lb. per acre—this containing the same amount of nitrogen as was present in the sulphate of ammonia applied on the two remaining plots.

There is always a certain amount of irregularity of plant growth in mangold experiments; the additional care involved in the applications of weighed quantities of manure necessitates walking on the plots, which is not good for the crop. The roots were pulled and weighed on 9th December, 1918: the results are as follows:—

Stackyard Field: Mangolds, 1918.

Seed sown 29th May; Roots carted 9th to 12th December.

Manure.	Weight of Mangolds. Per Plot ($\frac{1}{40}$ Acre).	Per Acre (Mean of Two Plots).
	Cwt. qr. lb.	Tons.
Superphosphate, salt, and sulphate of ammonia	19 1 8 17 3 20	18·6
Superphosphate, salt, and nitrate of ammonia	20 2 20 25 3 18	23·3
Superphosphate and salt	16 2 20 17 3 16	17·3

Manuring:—

All plots received a dressing of dung at the rate of 10 tons to the acre.
The other manures at the rate of—

Superphosphate	4 cwt. per acre.	
Salt	2 " "	
Sulphate of ammonia	2 " "	
Nitrate of ammonia	145 lb. "	(equivalent to 2 cwt. sulphate of ammonia).

The ammonium nitrate is clearly superior to the ammonium sulphate.

Experiments with Potatoes in West Barn Field.—The manuring was done in the same way as for mangolds, except that no salt was used: a dressing of dung was applied over the whole area at the rate of 10 tons per acre in December, 1917, and was shortly afterwards ploughed in. Superphosphate at the rate of 4 cwt. per acre was applied with the seed. To two of the plots sulphate of ammonia was given at the rate of 2 cwt. per acre, and to two others ammonium nitrate at the rate of 145 lb. per acre—these again containing the same amounts of nitrogen.

The variety of potatoes was "Arran Chief"; they were planted on 9th May, there being 27 rows in each plot of $\frac{1}{20}$ acre. Of the seven plots one was spoilt as the tubers were attacked by rats: the weights for the remaining six were as follows:—

West Barnfield: Potatoes 1918.

Variety "Arran Chief," planted 9th May; 27 rows in each plot of $\frac{1}{20}$ acre.

Plot.	Manure.	Tubers roughly cleaned. Weight per Acre.	Tubers roughly cleaned. Mean per Acre.
		Cwt.	Cwt.
9	Superphosphate and sulphate of ammonia	175·4	175·4
11	Superphosphate and nitrate of ammonia	178·9	174·5
14		170·0	
13	Superphosphate alone	146·8	160·9
10		175·0	
15	No artificials	144·3	144·3

A dressing of dung was applied over the whole field in the winter, and ploughed 10th December to 3rd January.

Rates per acre of artificial manures:—
Superphosphate .. .. 4 cwt.
Sulphate of ammonia .. 2 ,,
Nitrate of ammonia .. 145 lb.

The ammonium nitrate led to the production of very large haulms which might have been troublesome had there been much blight; fortunately there was not. The plots with superphosphate alone are irregular, but less than the figures indicate. Plot 10 contained a good many diseased tubers which were weighed in with the total: the actual saleable material was not much more than on Plot 13. On the whole the figures show no superiority over sulphate of ammonia for potatoes, and in view of the rank growth of haulm we consider it more risky.

Experiments with Wheat.—The variety grown was "Red Standard," and it was taken after clover. It was sown on 3rd to 5th November, 1917, and cut on 13th to 15th August, 1918. Two sets of plots were arranged at opposite ends of the field: they are therefore to be regarded as distinct experiments and not as duplicates. The actual yields differed, but the conclusions are the same in both cases. Ammonium nitrate turns out fully equal to ammonium sulphate.

Little Hoos Field; Wheat, 1918.

Variety.—"Red Standard" (after clover).
Seed sown.—3rd to 5th November, 1917.
Crop cut.—12th and 13th August, 1918.
Artificial Manures applied, 26th April, 1918 (by hand) consisting of—
2 cwt. superphosphate per acre,
1 ,, sulphate of ammonia per acre, or } These contain equal
72½ lb. nitrate of ammonia per acre. } quantities of nitrogen.

—	Dressed Grain per Acre.		Straw per Acre.	Total Produce per Acre.
Experiment I.	lb.	bush.	lb.	lb.
Unmanured	2,195	33·9	4,030	6,443
Superphosphate only	2,492	38·6	4,550	7,310
Sulphate of ammonia and superphosphate	2,630	41·3	5,250	8,178
Nitrate of ammonia and superphosphate	2,822	44·7	5,070	8,120
Experiment II.				
Unmanured	2,325	35·8	4,450	7,057
Superphosphate only	2,198	34·6	4,520	7,025
Sulphate of ammonia and superphosphate	2,585	40·1	4,830	7,775
Nitrate of ammonia and superphosphate	2,400	37·7	5,050	7,830

Experiments at other Centres.—Similar results to those just described have been obtained in Aberdeen by Hendrick. They are recorded in the *Journal of the Society of Chemical Industry* for 1918 (Vol. 37, p. 146). In these experiments ammonium nitrate appeared to be better even than nitrate of soda. Moreover, as in the Rothamsted experiments with mangolds, the ammonium nitrate gave better yields than ammonium sulphate containing equal amounts of nitrogen. Most of the tests were made on the hay crop: the results of twelve experiments carried out between 1911 and 1914 were:—

Plot.	Cwt. of Hay per Acre.		
	1911-1914. General Average.	1913. 3 Centres.	1914. 3 Centres.
1. No manure	42·4	49·8	49·6
2. Superphosphate and potash salts only	50·2	65·7	58·4
3. As Plot 2 plus nitrate of soda ..	53·8	69·2	57·8
4. As Plot 2 plus sulphate of ammonia	—	68·0	57·8
5. As Plot 2 plus nitrate of ammonia	56·2	69·7	59·9

Similar results were obtained with oats in 1911 and 1914 :—

Plot.	Lb. of Grain per Acre.	
	1911.	1914.
1. No manure	2,307	1,813
2. Superphosphate and potash salts only	2,477	1,853
3. As Plot 2 plus nitrate of soda	2,644	2,280
4. As Plot 2 plus sulphate of ammonia	—	1,893
5. As Plot 2 plus nitrate of ammonia	2,787	2,427

The ammonium nitrate was probably not the "non-deliquescent" variety: Hendrick states that it rapidly became damp and liquefied on exposure to air. As already mentioned this difficulty can be largely overcome.

Two experiments made at Newton Rigg with mangolds in the years 1913 and 1914 may be mentioned. In neither case, however, was the result as good as that with nitrate of soda :—

	Yield per acre.	
	1913. Tons.	*1914.* Tons.
Nitrate of soda	20¾	23⅜
Nitrate of ammonia	14¾	21½

Notes on Manures for March: *From the Rothamsted Experimental Station.*

PERHAPS the most important matter requiring attention at the present time is the application of top-dressings to winter corn. The autumn and winter months were wetter than usual, the rainfall at Rothamsted being :—

	Sept.	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Total in Five Months.*	*Excess in 1918-19.*
For 1918 and 1919	5·42	1·96	2·67	3·18	4·11	17·34	4·4 in.
Average for 60 years	2·37	3·18	2·58	2·47	2·34	12·94	

Not only was there more rain, but also the number of wet days was greater than usual :—

	Sept.	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Total in Five Months.*	*Excess in 1918-19.*
For 1918 and 1919	24	15	17	26	25	107	27 days
Average for 60 years	13	18	16	17	16	80	

The effect of this excess is to wash out valuable nitrates, without which large crops cannot be grown, and the situation

has to be met by applying nitrates or the next best substitute—*sulphate of ammonia, or, if unobtainable, nitrate of ammonia.*

The actual loss of nitrate depends on many circumstances, such as previous cropping, nature of soil, amount of rainfall, etc., but one would probably not be far out in putting it at the equivalent of ¾–1 cwt. of sulphate of ammonia. At any rate a dressing of this size has a useful effect in increasing the yield both of grain and of straw. Many examples might be quoted: the following from recent threshing results show the increases that were obtained with the wheat crop last season at Rothamsted:—

Yield of Wheat.	*No Spring Dressing.*	*Super-phosphate only.*	*Super-phosphate + 1 cwt. Sulphate of Ammonia.*
Grain, bush. per acre, I.	33·9	38·6	41·3
,, ,, ,, II.	35·8	34·6	40·1
Straw, lb. per acre, I.	4,010	4,550	5,250
,, ,, ,, II.	4,450	4,520	4,830

I. and II. represent separate experiments at opposite ends of the field, but both agree in showing profitable increase from the application of the spring dressing.

The preceding crop had been clover, and many farmers would have thought that nothing more would be wanted for the wheat in spring. On this land, which is only second-rate, the 33·9 and 35·8 bush. obtained on the unmanured plots represent distinctly good yields, the result of the previous clover. These yields, however, are increased to above 40 bush. by the use of the spring dressing, and there is a corresponding increase in the straw. The crop stood up perfectly well and showed not the smallest tendency to go down. In this case the dressing was applied on 26th April, 1918; it could, however, quite well, and indeed preferably, have gone on earlier. Whilst one would not apply a spring dressing while the ground is frozen, it can be put on as soon after frost as the land will bear the horses. Any time after the middle of February is suitable.

If soot is obtainable it can be used instead of sulphate of ammonia, over which, indeed, it has some advantages, notably that it helps to warm the land and to keep off slugs and certain other pests. Twenty bush. of soot would be about equal in nitrogen value to 1 cwt. sulphate of ammonia, so that if sulphate of ammonia is obtainable at 16*s.* 9*d.* per cwt., soot is worth something more than 10*d.* per bush. But it must be good light household soot, and not furnace soot, destructor dust,

or the black material sometimes offered. Unfortunately this year's supplies are likely to be less than usual, owing to limitations of coal combustion.

The addition of superphosphate is advisable to help the young plants make an early start in spring and to hasten the ripening in autumn. The heavy rain of this winter has made this course additionally desirable.

A correspondent has recently asked whether superphosphate might be mixed with nitrate of soda to make a top-dressing or whether it is essential to apply the two fertilisers separately. The answer is that these two fertilisers can be mixed provided the superphosphate is dry and *the mixture is applied at once. The mixture should not be stored, and it should not be made if the superphosphate is damp.* In such cases red fumes may be evolved, which are exceedingly irritating, and in extreme cases poisonous. Dissolved bones should not be mixed with nitrate of soda.

Lime in Pastures.—This is the time for applying lime to pastures, and in cases where this course is known to be desirable it should be adopted as soon as possible. Trials should, however, always be made to ascertain whether lime or basic slag will give the better result. Cockle Park affords an instance of a poor pasture on heavy clay soil, which at first sight would be expected to respond to lime. It does so, but it gives a much better return for slag.

	Live-weight Increase of Sheep over Unmanured Plot. Lb. per acre.	*Yield when Cut for Hay.* Cwt. per acre.
No manure	—	8½
Lime 4 tons per acre, 1897 and 1903	12⅝	12½
Basic slag, *10 cwt.* per acre, *1897* ..	79⅝	2⅝

Clover Mixtures.—In view of the great importance of clover in the rotation it is imperative to take all possible steps to secure a good crop. Where red clover is grown alone there is liability to failure through clover sickness, especially when the preceding clover crop had shown signs of failing. The recommendation has recently been made that a mixture should, therefore, be grown. Mr. Arthur Amos of Cambridge, however, points out that alsike is very susceptible to eelworm and to the fungus *Sclerotinia*, both of which may cause sickness. On the other hand, sainfoin is immune, and trefoil, lucerne and white clover are practically immune, to the eelworm disease; these crops could, therefore, be grown where eelworm has caused

's not,

of course, a fertiliser question, but a proper mixture may make a considerable difference to the effectiveness of manures.

Town Wastes and Refuse as Manures.—The campaign against national waste has led to the examination of the possibility of converting town waste into manure. Unfortunately, in spite of its unpleasantness, the material is not very good, and could only be purchased at a low price. The following is a recent sample :—

Nitrogen	1·22 per cent.
Ammoniacal nitrogen	0·52 ,, ,,
Phosphoric acid (P_2O_5)	0·30 ,, ,,
Potash (K_2O)	0·80 ,, ,,

This material is richer than some of the samples examined owing to the incorporation of a certain amount of soot, but it was still too low in grade to come into general use. Of course, farmers having easy communication with dumps of town refuse may advantageously use it, especially if they are farming heavy land, but they must not make any extravagant anticipations and should carefully go into the question of cost.

Dissolved Bones.—In the Fertiliser Notes for January December issue of this *Journal*)* some instances are given of tests of dissolved bones against superphosphate which show no advantage in the bones in spite of their high price, and farmers are, therefore, urged to consider whether they are really worth buying. A correspondent who claims to an extensive trade in dissolved bones states that the preference for them shown by his clients " is not based simply on the actual crops obtained from the fertiliser. Pure dissolved bones act as a fertiliser and, in addition to this, keep the soil in excellent tilth, and by comparing soils where the two manures (dissolved bones and superphosphate) have been largely used for years the difference is very distinctly to be seen." Further, he states that superphosphate gives a bad tilth.

If any farmer or grower has a field on which superphosphate gives a bad tilth and dissolved bones a good one, the Director of the Rothamsted Experimental Station would like an opportunity of seeing the two tilths, as, in spite of careful inquiry, he has never yet been able to find a case where dissolved bones are superior to superphosphate and the equivalent amount of

THE PRODUCTION OF GROUND CHALK.

B. H. BEDELL.

THE falling off in lime supplies, owing to lime burners and lime getters having been called up, induced the Food Production Department to encourage the production of ground chalk for agricultural use, and towards the end of 1917 the Department installed an experimental plant at the quarries of Messrs. Hall & Co., Ltd., at Coulsdon, Surrey.

This plant has been erected close to the working face, and the lump chalk is wheeled directly on to a drying floor where it is spread about a foot thick. When it is dry enough to grind it is wheeled to the feeding-mouth of the grinding mill, which is on a level with the drying floor and within a few feet of it. The mill, which can crush up to 6 tons per hour, is in a chamber excavated below ground level. This chamber also contains the electric motor, from which power for the whole of the plant is derived. The chalk after being powdered in the mill falls to a still lower chamber excavated beneath the first, and here it is picked up by a chain and bucket elevator and taken to the top of the building, whence it gravitates down chutes either directly into railway wagons or into a storage bin or is bagged. All these operations take place in covered buildings, although in some places, as for instance the drying shed, no side walls are provided, since a free play of air is manifestly to be desired.

The plant has an output of between 150 and 200 tons per week, 5 men being employed. Almost all the finished product is sent away loose in bulk in truck, a small proportion only being bagged when specially ordered. The price charged at present is 15*s*. per ton, but it is possible that the ground chalk can be produced at 12*s*. 6*d*. per ton or less under favourable conditions as regards labour and fuel.

The following notes based on the experience gained in the construction and use of this plant are intended for the guidance of persons proposing to erect plant for crushing chalk.

Mills of the disintegrator or beater type with swinging hammers have proved quite suitable for the work. The highest mechanical efficiency is attained with only two (instead of four) beaters in use. The screen bars when set with ½-in. spaces between them yield a satisfactory product and will allow chalk containing as much as 18 per cent. of water to pass through without clogging the mill. When working at full

found that the energy consumption averaged 5 B.T.U. input to motor per ton-hour output, which would be about 5·5 H.P. on the shaft of the disintegrator. These figures were derived from a mill capable of 6 tons per hour output.

The comparatively large percentage of water contained in the chalk as it is passed through the mill has caused a complete absence of the dust troubles usually associated with this kind of plant.

The chalk at Coulsdon contains up to 30 per cent. of water as it is quarried; it is therefore quite impossible to take it straight from the working face to the mill, since even if it would pass through—which it will not—the resulting product would be a sticky mass, quite useless for distribution.

Various plans for drying the damp chalk were considered, and after inspecting various analogous installations it was decided both on grounds of first cost and fuel consumption that some type of drying floor should be employed, rather than any of the rotary driers which can be obtained for this class of work.

The difficulties connected with obtaining large quantities of thick steel or cast-iron plates for the floor in war time led to an investigation into the possibility of using a reinforced concrete floor. Contrary to all preconceptions on the point, calculations based on the known thermal conductivity of concrete* showed that a thoroughly efficient floor could be built of that substance, and that by slightly increasing the area beyond that which would be considered sufficient for an iron floor, an equal efficiency (tons of chalk dried : cwt. of coal burnt) could be attained.

A reinforced floor 3 in. thick was built and has completely confirmed the theory, for it is found that working right through the season the fuel consumption has been only 0·75 cwt. of gas coke per ton of chalk dried, the drying consisting in an average reduction of moisture from 27 to 10 per cent.

This result is not quite so surprising when it is remembered that the chalk (which on account of the cost of handling cannot be spread much less than 12 in. thick on the floor) is itself a very good heat insulator, particularly so when dry, and that on this account, no matter of what material the actual floor is made, the heat which reaches the upper 6 in. of the drying chalk has had to pass through 6 in. of one of the best non-

* The thermal conductivity of an average concrete is such that with a floor 3 in. thick [illegible] B.Th.U. per hour will pass through it per ft. super per

conductors of heat. Hence it follows that, as the concrete is a much better heat conductor than chalk, almost the whole "thermal drop" will be across the bed of drying chalk. Actual measurements of temperatures gave the following results:—Thermal drop across floor 15°C., across chalk 186°C. Since therefore a slight increase of area of the floor will entirely compensate for the lack of conductivity of the concrete, and concrete forms such a much better surface for shovelling than warped steel plates (plates on drying floors always warp after being in use for a short time) it follows that concrete is the better material to use. Care must be taken that fire-resisting material (firebrick or lumps) is used to cover the furnace and flues for a sufficient distance to enable the temperature of the hot gases to fall to about 600°C., so as not to dehydrate the cement. A suitable ratio of grate area to floor surface has been found to be 1 : 30; with this ratio about 1 ton of chalk per diem for every 40 sq. ft. of floor area can be dried with an expenditure of 0·75 cwt. of coke. The fires should be thick and slow; a stack 20 ft. high gives ample draught, and even then a damper should be provided to regulate the rate of combustion. It is sufficient to allow a chimney to fire-grate area of 1 : 10.

The product turned out by such a plant as that at Coulsdon is of medium coarseness, about 40 per cent. of it passing a 200 × 200 screen. The fact that the larger particles are not immediately available for neutralising soil acidity, but become so after one or two seasons exposure in the ground, is possibly no disadvantage, since there is always a large proportion of very finely-divided chalk present which is immediately available.

Report of Committee on the Employment on the Land of Returned Sailors and Soldiers.

THE Committee of Section IV. of the Advisory Council of the Ministry of Reconstruction was appointed by the Minister of Reconstruction in March, 1918, the terms of reference being "to consider the steps and conditions, apart from the provision of Farm and Small Holding Colonies, necessary to attract to employment on the land all returning sailors and soldiers who may wish to take up country life, and particularly to induce them to do so in sufficient numbers to secure the maximum output from the land." A report has recently been issued

giving the Committee's recommendations relating to England and Wales. These recommendations are summarised as follows :—

1. That an executive committee should be set up to ascertain the numbers of ex-service men desiring to settle on the land, and to deal with their training and the placing of them in employment.

Housing.—2. That (subject to certain reservations) the State should adopt the housing policy outlined in the memorandum submitted to the President of the Local Government Board on 6th August, 1918.

3. That as a temporary expedient the proposed executive committee should examine into the possibility of meeting the immediate housing requirements by the use of military hutments or otherwise.

Acquisition of Land.—4. That a special sanctioning authority should be appointed, as recommended in the report of the committee on the acquisition and valuation of land.

5. That for providing small holdings the county councils should be the sole authority.

6. That county councils should be empowered to acquire land which can be leased to parish councils for the purpose of allotments.

7. That the county councils should be the rural housing authority and as such acquire the necessary land.

8. That land needed for village halls and recreation grounds should be acquired through the county councils, but that the parish councils (or 5 per cent. of the local government voters) should have a right of appeal to the Board of Agriculture to take action where the county council has refused to act.

Small Holdings.—9. That the financial restrictions at present imposed by the Treasury should be removed.

10. That county councils should be enabled to deal with the existing unsatisfied demand for small holdings, and should be encouraged to obtain suitable land in advance of the demands actually made upon them.

11. That the Small Holdings Committee of the county council should be given a statutory position analogous to that of the County Education Committee, and should include representatives of the small-holding class.

12. That a county council should be allowed to treat its total liabilities in the provision of small holdings as a single account, and that the State should make a grant of 40 per cent. of the actual cost of equipping small holdings for ex-service men.

13. That in regard to stocking a holding the State, where necessary, should lend the working capital, but that the services of the agricultural co-operative societies should be utilised wherever possible.

14. That the Small Holdings and Allotments Act, 1908, should be amended in the following particulars :—

(*a*) Powers of improvement.

(*b*) Sixty years allowed for loans on buildings.

(*c*) Exemption from local by-laws.

(*d*) Removal of restriction against compulsory acquisition of a holding of 50 acres or less.

(*e*) Power to acquire land to be sub-let by parish councils as allotments.

15. That a small holder who is tenant of a county council should not be called upon to contribute in his rent to a sinking fund in respect of the purchase price of the land.

16. That, subject to adequate safeguards, a small holder should have the option of buying his holding outright, and that the total cost of land and equipment should be advanced to him on the basis of annual repayments including sinking fund and interest.

17. That men without practical experience should be encouraged in the first instance to work as wage earners.

Training.—18. That for those who intend to become large farmers, farm managers, organisers, or experts, the training should include a course at an agricultural college as well as on a farm, the complete period of training being usually for a period of two years, and that studentships should be provided by the State for suitable persons.

19. That steps should be taken to increase the accommodation, staff, and number of agricultural colleges.

20. That, in connection with training in forestry, the proposed executive committee should refer to the interim forestry authority, and that the forestry authority should get into touch with the local pensions committees who have already initiated schemes.

21. That intending small holders who cannot be accommodated in a small-holding colony should, in the first instance, work as labourers on some well-managed small holding or suitable farm.

Wages and Employment.—22. That an ex-service man taking up work as a farm labourer without previous experience should receive not less than the full local rate of wages, but that the State should, in such a case, for a limited period and by way of premium, contribute towards the difference between the man's economic value and the local rate of wages; and that a similar system should apply in the case of those who are so working with a view to becoming small holders.

23. That a list of suitable farmers who would employ men on the above terms should be prepared.

Trade Organisation.—24. That special attention should be given to instruction in book-keeping and cost accounting.

25. That the principle of co-operation in agriculture should be extended on the lines recommended by the Agricultural Policy Sub-Committee.

26. That improvement in transport facilities should be included in the programme of the State's agricultural policy.

27. That an experiment should be made in the institution of rural information offices.

28. That the State should encourage the provision of agricultural credit facilities on the lines adopted by the Agricultural Organisation Society.*

Village Life.—29. That an organised effort should be made, as recommended by the Agricultural Policy Sub-Committee, to improve the conditions of village life, and that the State should have a definite policy on the subject, should, if necessary, appoint commissioners to supervise the carrying out of that policy through the local authorities and voluntary organisations, and should be responsible for the extra financial burden attributable to war prices.

30. That the policy adopted should include the establishment of village clubs and village halls, recreation grounds, and improved

* See this *Journal*, December, 1918, p. 1078.

passenger transport, and the provision of good gardens and allotments, common pasture, and electrical facilities, and the general encouragement of rural industries.

31. That, if necessary, grants should be made by the State to the Village Clubs Association and the Women's Institute movement for the express purpose of providing local machinery which can give effect to the powers possessed by local authorities, in addition to the grants to the county councils for providing technical instruction and to the Agricultural Organisation Society for organising supply and disposal.

Voluntary Effort and Private Enterprise.—32. That voluntary organisations should, if necessary, be registered and be subject to audit and inspection by the State, but that the State should recognise that the primary duty in connection with village reconstruction must lie with itself.

"Per Head" Charges on Cattle and Sheep: Regulation from the Farm to the Nation's Dinner-table.

By a series of Orders issued between May and November, 1917, the Food Controller made certain provisions regulating the sale of meat by wholesale and retail and prescribing maximum wholesale prices for carcasses and, in some parts of the country, for various cuts of meat usually sold by wholesale. Power was also given to Food Control Committees to prescribe schedules of maximum retail prices which were not to be exceeded by butchers in their district, and it was further provided that in no case was a butcher to charge the consumer a higher price than that represented by a certain percentage over and above the prescribed wholesale maximum prices. No control was, at that time, placed upon the prices which might be charged by farmers or paid by wholesale or retail butchers for live cattle and sheep, and every trader was allowed to buy live stock at any place and at any price and up to any amount.

Inequality of Distribution.—In these circumstances retailers who had been in the habit of buying live stock, being anxious to maintain or increase their turnover, were paying, and the farmers were accepting, prices for live stock quite out of proportion to the prices at which the butchers were compelled to sell the meat. Wholesalers, compelled to supply dead meat at maximum prices, were also buying in a competitive market, which involved a loss in sales at the prescribed maximum prices. By acting as "agents" for the retailers and charging expenses and commission, some wholesalers contrived to make a profit at the expense of the retailers. The effect of these conditions was that the wealthier butchers in residential districts continued to obtain a supply of good meat because they were prepared to incur a temporary loss in order to retain and increase their custom, and the poorer industrial areas were left with an irregular supply of the inferior meat. Distribution was unequal as between the rich and the poor, while both retailers and wholesalers were losing a very large sum of money every week through a system which retained competitive trading at the supply end, but imposed maximum prices in distribution.

Such a state of things could not continue. During the week or two before Christmas, 1917, the Food Control Committees were in many cases allowing the butchers to exceed the maximum retail prices, and, if steps had not been taken to secure control of the live stock, the whole of the control of meat prices must have broken down.

Inception of Grading and Allocation.—On 24th December, 1917, the Food Controller accordingly made the Cattle (Sales) Order,* under which regulations were issued compelling all cattle to pass through a market, where they were to be graded and allocated to the butchers in accordance with the requirements of their customers at fixed prices mentioned in the schedules of the Order. The effect of the Order was that the Food Controller became the sole purchaser of all beasts for slaughter. By his agents in each market the Food Controller buys the proportion of the fat stock required from that market for the nation's meat supply. He thereupon re-sells some of the beasts to local butchers present in the market and sends others for sale (alive or dead) in distant industrial centres.

Even so, there could be no flat rate to the consumer unless the charges entailed in sending cattle or meat to distant centres could be met, and, accordingly steps were taken to equalise the cost of all charges between the farmer and the butcher's shop, no matter how far apart the districts in which they might be situated. In order to meet these charges of distribution, the Food Controller decided to collect a fixed "per head" charge on every beast bought and sold, these charges being pooled and the total costs of such distribution borne out of that pool, which is known as the "Central Live Stock Fund." The "per head" charge, therefore, is simply an equalising charge collected by the Food Controller in the course of the transactions between himself and the farmer on the one hand and the butcher on the other. In return the farmer and the butcher are relieved of all expenses between the farm and the retail shop. This has the desired effect of making the return to the farmers and the price of the meat to the butcher and to the retail customer the same in every case, whether the farmer and the butcher are situated alongside one another in a country village, or whether they are as far apart as Aberdeen and London.

It should be noted that there is no question of any profit being made by the Food Controller. The Live Stock Fund is merely a device for pooling varying costs and charges on the one hand and meeting them by a flat-rate charge on the other. As the services rendered, and consequently cost, increased, so the flat-rate charge has had to be increased. The whole finance is based on an attempt to make ends meet exactly, so that the Ministry of Food is involved in no loss and makes no profit.

During the first few months of control it was only possible to make the per head charge cover the three items of railage, auctioneers' fees and selling commission, and for this purpose a per head charge of 30*s.* per beast was imposed, this amount being collected in the following manner:—

The price to be paid to the farmer for his beasts was assessed at 1*s.* per cwt., or (on the average) 10*s.* per beast, less than the full price which would have been paid for the beast according to the schedule price of the dead meat expected to be obtained therefrom, and the price to the butcher was put at 20*s.* per beast in excess of the scheduled price. As a temporary expedient, for two months only, pending a readjustment of the maximum retail prices, retail traders paid the per head charge (averaging 20*s.* per beast) out of their profits.

Expenses between Farm and Retail Shop.—It had been intended to adjust retail prices at the end of the two months so as to balance the

* Printed in this *Journal*, January, 1918, p. 1150.

account exactly; but just at that moment it was found necessary to introduce a rationing scheme based directly on the cost of meat to the consumer, and it was thought undesirable to disorganise the introduction of the scheme by suddenly altering all the retail price schedules throughout the country. Consequently, it was necessary to put the *price to the butcher right on the basis of the then existing schedule of* retail prices by temporarily remitting the 20*s.* charge which he had been paying. Farmers' prices and the retail prices remained unaltered. But at the same time the services covered by the per head charge were extended, as was originally intended, to cover all expenses between the farm and the retail shop.

These expenses were :—Railage on live stock from farm to market; grading committees in each market; auctioneers' commission; market tolls; lairage; feeding; insurance; railage from market to slaughter-house; dealers' charges on transfers of stocks; droving; slaughtering charges; slaughter-house dues; meat-market dues; refrigeration and sheeting; cartage and porterage; railage on dead meat; Wholesale Meat Supply Association commission; adverse differences between live-weight and dead-weight prices on cattle purchased on Government account; administration.

An estimate of the average cost of the above charges was made before live stock control was instituted, and assessed at 43*s.* per beast. This estimate has since been proved to be correct over a period of some months, but is bound to vary from time to time.

The introduction of rationing on a price basis rendered it necessary to get the prices of all imported meats on to a parity with the retail prices of home-produced meats. On no other basis was it possible to make a rationing scheme workable under which each individual was entitled to a certain value of meat per week. The prices of imported meats varied from country to country and from week to week, the general tendency in North America, at any rate, being upwards. Consequently, it was necessary, if all imported meats were, so far as the butcher is concerned, to be brought on to the same basis as home-produced meat, for the Ministry of Food to take over the purchase of imported meats, to pool their prices and to sell them to the butcher at the same flat price, so that he in his turn could retail them at the fixed flat retail prices.

On this basis some imported meat had to be sold at a considerably lower price than that which the Ministry had to pay for it, whilst on other imported meat considerable profit was made. The balances, whether in favour of or against the Ministry of Food, were paid into or charged from the Live Stock Fund, and since, during most of 1918, owing to the difficulties of the shipping situation and the necessity of transporting American troops, we were mainly dependent on North American frozen meat, whose price basis is far higher than any meat in any other market, and which costs considerably more than the price at which it was retailed here, there was a considerable charge on this head against the Live Stock Fund.

How the Live Stock Fund Works.—Next it was arranged, in order to secure an even flow of cattle to the markets throughout the winter months, that the prices received by the farmer for his cattle should increase from month to month throughout the winter. But it was

necessary to arrange that, though the farmer received a varying price for his cattle, the butcher continued to get his meat wholesale at a flat price. This was secured by throwing the differences in the months when the prices to the farmer were high as a charge on the Live Stock Fund. Thus the Live Stock Fund has to meet:—

(*a*) The charges between the farm and the butcher's shop set out above.

(*b*) Any adverse balances from time to time in connection with the purchase and re-sale at the fixed price of imported meat.

(*c*) The additional prices paid to the farmer for cattle produced in the later winter months.

The only sums, in addition to profits on certain classes of imported meats collected for the credit of the Live Stock Fund, are the per head charges on live stock, and these charges have been adjusted from time to time so as to meet exactly the sum total of the liabilities estimated as nearly as possible without any profit and without any loss to the Ministry.

Avoiding a State Subsidy.—As stated above, during the period from March to September, 1918, when retail prices were adjusted, the sum of only 10*s*. per beast was collected as against the estimate of about 43*s*. per beast. During this period considerable arrears accumulated to the debit of the fund, and it was necessary that, if possible, such arrears should be wiped off before the end of the financial year—31st March, 1919. The per head charge, therefore, was calculated for the period from September to March on a sufficiently heavy basis to balance the account by then, and, at the same time, so as to enable the butcher to pay the per head charge in the price of his meat, the retail prices to the consumer were increased approximately 2*d*. per lb. The increase in prices and the increase in the per head charge came into operation in the latter part of September, 1918. This per head charge, the amount of which depends on the weight of the beast, has been calculated so as to provide a sum sufficient to cover all the charges set out above as well as all the arrears on the period between March and September, 1918. It should be noted that some of these charges cannot be exactly tabulated. For example, instead of there being an adverse balance on imported frozen meat, it is anticipated that there will be considerable advantage accruing to the fund owing to the fact that we are much less dependent on the high-price American meat and shall receive much larger quantities of the lower-price Australasian meat. But, on the other hand, it is not possible exactly to estimate the number of cattle that will come forward at the higher prices during the later months of the winter. If, as time goes on, it should appear that the Central Live Stock Fund may become insolvent, the "per head" charge would have to be increased to the extent which is found to be necessary.

The remarks with regard to cattle apply *mutatis mutandis* to sheep. It may also be interesting to note that the question whether the Central Live Stock Fund will be in credit or debit at the end of the financial year—March, 1919—depends upon the variations which may take place in the many items with which it is concerned, and until that date is reached it is impossible to say definitely how much the balance will

AN inquiry was held at King's Lynn last summer on behalf of the Board of Agriculture into certain proposals for improving the outfall of the River Ouse. The special Commissioner appointed for the purpose was Mr. Sidney Preston, C I.E., formerly Inspector-General of Irrigation in India. The inquiry extended over many days; and the schemes put forward were exhaustively canvassed by leading engineers and counsel.

Land Drainage: The Great Ouse.

The result is an extremely informing Report, which has now been made public. The greater part of it is highly technical; but in the concluding paragraphs Mr. Preston draws attention to the state of this river system as a whole—which is unfortunately typical of many others in the country. He points out that it is useless to obtain a perfect outfall if the upper lengths and branches of the river are in such a state that the water cannot reach the outfall quickly enough.

So long ago as 1809 Sir John Rennie made his celebrated report on the drainage and navigation of this portion of the Bedford Level. He pointed out how obstructed was the outfall, how inadequate were the channels in this flat country to carry off the water at flood times, and how contracted were the waterways of bridges and sluices. Large and expensive works were carried out in the following half century for the improvement of the outfall. Reports prepared by Mr. R. F. Grantham for the Board of Agriculture in 1918, however, show that the river and its tributaries were then still in the same bad order that Sir John Rennie described more than a hundred years ago.

It should not be forgotton that the Ouse is one of the longest rivers in the country. Together with its tributaries, it forms the drainage outlet for 2,000,000 acres, the greater part of which is agricultural land of high value.

The causes of the neglect of this most important system in the past are attributed by Mr. Preston to the multiplicity of authorities having control over different sections of it. Certain of these authorities, it is true, carry out their drainage duties with vigour and efficiency. There can be little doubt, however, that Mr. Preston has put his finger on the vital spot. The depression in agriculture, of course, has had something to do with the general reluctance to spend money on improvements which are so much needed; but that cannot be the sole cause of the bad state of this river-system, since it does not account for more than [illegible] out of the [illegible] years that have elapsed since Sir

The matter has now, however, forcibly attracted the attention of those most nearly concerned. The majority of the county councils whose counties lie along the Ouse and its tributaries have petitioned the Board of Agriculture to set up a single drainage board for the whole system. The Board hope shortly to prepare a scheme on which they will invite the criticism of the county councils, the existing drainage authorities, and the agricultural interests concerned. At present it is not proposed to deal with internal drainage, but only with the bed and banks of the main river and its principal tributaries. Prisoners are already employed on effecting such clearance about the upper reaches as can be carried out in the winter months.

Land Drainage in Lancashire.

FROM many parts of the country come further reports of interest and activity in the matter of land drainage. In South-west Lancashire the valuable triassic lands behind Southport possess several artificial systems of drainage which have been made and kept up by the large landowners of the district. These systems are mostly in good order, though they somewhat lack cohesion as a result of having been created by individual effort. The River Douglas, however, and its tributaries, which constitute the principal natural drainage system, are badly congested. The Lancashire Agricultural Executive Committee have been able in the past season to effect a substantial improvement, having taken over the functions of the Commissioners who control a portion of the rivers; but the Committee have been heavily handicapped by the almost unprecedented rainfall of the autumn and winter, and, in spite of all their efforts, considerable areas of fine agricultural land are severely flooded. The neighbourhood in January presented a striking object lesson in the necessity for organisation on a wide basis and for constant watchfulness in the clearing and maintenance of rivers and artificial channels. These matters are of national concern; and a haphazard system, which depends on the public spirit or enlightened self-interest of a few individuals, or on the energy and economic enterprise of a local authority with a limited area and limited powers, is no longer adequate to the circumstances of to-day.

Fortunately, this is recognised in many counties. In Lancashire, in the *Holland Division* of Lincolnshire, in the counties on the Great Ouse, in all three Ridings of Yorkshire, in Berkshire and in Surrey, as well as in Welsh counties like Flintshire, Merioneth, Cardigan, and Montgomery, there is a definite demand for a wider organisation of drainage areas. The Board of Agriculture hope to satisfy this demand [illegible] the Acts of Parliament allow.

The Encouragement and Improvement of Light Horse-Breeding, 1917-18.

THE adverse conditions under which the Light Horse Industry was carried on during the year under review (1st November, 1917—31st October, 1918) were even more marked than in the previous years of the War. There was practically only one market for the riding horse, the Army market, which is not a sufficiently remunerative one to encourage breeding. There was, owing to the raising of military age, a further withdrawal from civil life of stud employees, shoeing smiths, etc., and no little difficulty was experienced in the proper feeding of horses owing to shortage of forage and the Horse Rationing Orders.

The very restricted supply of petrol for commercial motor traction, the ploughing of thousands of acres of grass land, and the purchase of draught horses for the Army, brought about a demand for heavy horses in excess of the supply, with the result that prices soared high above the normal, and many farmers, whose custom in past years had been to put their half-legged mares to thoroughbred stallions, sent the mares this year to heavy sires. In view of the above-mentioned circumstances it is not unsatisfactory to find that the average number of mares served by the Premium stallions in 1918 was 59.

It is to be hoped that those who have carried on in these difficult times and continued to breed light horses will reap their reward on the resumption of hunting and polo, on which the production of our high-class riding horses depends so largely.

The War has shown how important is the production of good active horses of strong constitution, and the Board have it from Field-Marshal Sir Douglas Haig himself that Cavalry has been, is, and will continue to be indispensable in modern warfare, however great the development of the Air Force may be in the future. In an advance, he says, mounted troops are essential, and in rear-guard actions their use has proved invaluable. They can be moved quickly to threatened localities and are not dependent on roads or railways; and traffic control, which is all important in the rear of the battle zone, cannot be carried out satisfactorily in the absence of mounted men. In open country, moreover, such as the theatre of war in which General Allenby's troops were operating, Cavalry played a most important part, and the use of them had a very decisive influence on the results obtained. In this connection it may be mentioned that the War Office have furnished the

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various types of horses used in the Army, and in all of them there is unanimity of opinion that the well-bred hunter on short legs and of moderate height is the ideal riding horse for the Army, and though the price which the War Office have hitherto been authorised to pay cannot secure the ideal, it is the type that breeders should aim at to produce. At its best it commands a remunerative price in the hunter or foreign market, and even if it misses the ideal it is the type required for Army purposes.

With reference to "misfits" the Board wish once more to emphasise, as they have done in previous reports, the importance of breeding not only from good sound sires, but from good mares as well. Some farmers apparently think that the selection of a mare for breeding is of little, if any, importance, provided she is put to a good stallion. The practice of breeding from a worn-out mare, which is past work and may never even have been bred from before, is simply courting failure. Unfortunately this practice is far too common. It brings discredit to many a good stallion and is responsible for a large number of the ill-bred animals which show no profit to the breeder and are of no value to the State.

Soundness is of first importance in breeding, and much has been done by the horse-breeding societies to educate breeders to this fact by withholding their prizes and premiums to sires unless certified sound. Since 1911, when the Board were first placed in funds for assisting the Light Horse-breeding industry, steps have been taken to encourage the voluntary registration of sound stallions, and so well has this scheme been supported that the number of stallions registered in 1918 was 2,019.

A big step forward in this direction has been taken during the year under review, and an Act of Parliament—the Horse Breeding Act, 1918—has been passed, making it illegal to travel a stallion for service after 1st January, 1920, unless it has been licensed by the Board as sound and suitable for breeding purposes.

Commissions and committees, that have reported during the last fifty years on various aspects of the horse-breeding industry, have drawn attention to the great harm done by the use of unsound stallions. The Government have received the support and approval of all the horse-breeding societies and of all those who have at heart the improvement of the horse-breeding industry; and though several years must necessarily elapse before the result of the Act will be apparent, there can be no

Appended are the foaling results of the 1917 Service Season and information as to the Premium Awards and Service Season, 1918.

Foaling Results for Service Season, 1917.—From the returns furnished to the Board of the mares served by the 60 King's Premium Stallions the foaling percentage works out at 54, being the same figure as in 1915, though slightly below that of 1916. "Stortford," the property of Captain Faudel Phillips, proved to be the best foal-getter of the year, serving 82 mares with a foaling percentage of 78.

The 40 Board's Premium Stallions had an average foal-getting record of 53 per cent., which was slightly below the average for the 1916 season (56). The worst record of any subsidised stallion was that of a Board's Premium Horse which served 54 mares with a foaling percentage of 13. This stallion has been castrated.

The average amount paid by the Board for the 48 King's Premium horses was £277 and the maximum £348. With the addition of the service fee of £1, payable by mare owners, the average earnings became £340 and the maximum £438. The average payment for the 12 Super-Premium Stallions was £399 and the maximum £464, and the average and maximum earnings were £470 and £554 respectively.

Service Season, 1918.—Owing to the commandeering of the Agricultural Hall for war purposes, the Annual Show was held at the Park Paddocks, Newmarket, which were kindly placed by Messrs. Tattersall at the disposal of the Board and the Hunters' Improvement and National Light Horse Breeding Society for the purpose, and the arrangements made for the stabling and exhibition of the horses were all that could be desired. The Show took place on 5th and 6th March and there were 156 entries, of which 36 were stallions that had not been previously shown. The Judges were Mr. J. W. A. Harris, Lieut.-Colonel J. McKie, D.S.O. and the Hon. Alexander Parker. They reported that the quality of the horses exhibited showed an improvement on 1917, when the standard was a very high one.

Sixty King's Premiums (including 12 Super-Premiums) were again awarded, and the King's Cup was won for the second time by "Rathurde," a stallion owned by Captain T L. Wickham-Boynton. The reserve horse was "Gay Lally," the property of the Compton Stud.

The sixty stallions to which the King's and Super-Premiums were awarded served 3,665 mares—an average of 61 mares a

stallion. Premiums (termed Board's Premiums) were awarded on the recommendation of the County Horse-breeding Committees to 33 other stallions, and these horses served 1,857 mares, being an average of 56 mares a stallion.

Riding Pony Premiums.—Six of these Premiums, of the approximate value of £80, were awarded in 1918. The average number of mares served by the six stallions in 1918 was 47, as compared with 45 in 1917. The foaling percentage to the 1917 service was 55, as compared with 58 in the previous year.

Premiums to Welsh Cob, Fell, Dale, Mountain and Moorland Ponies.—Sixteen Premiums for Welsh Cobs were awarded in 1918, and they travelled as follows: 3 each in Cardigan, Carmarthen and Montgomery; 2 each in Brecon, Merioneth and Radnor, and 1 in Glamorgan.

Three Premiums were awarded to Dales Pony Stallions on the recommendation of the Dales Pony Improvement Society, and 5 Premiums were awarded to Fell Ponies selected by the Fell Pony Committee.

Twenty-six Premiums were awarded to Mountain Ponies in Wales and ten to those in the New Forest.

Brood Mares Scheme.—As was the case in 1917, no funds were provided in 1918 for the award of grants to County Committees for the purchase of brood mares

Registration Scheme.—During the year 1917-18, the number of stallions placed on the Board's Register was 2,019, the highest number yet recorded, and nearly 200 more than in the previous year. The stallions comprised 1,183 Shires, 262 Thoroughbreds, 155 Hackneys, 151 Clydesdales, 149 Ponies, 79 Suffolk Punches, 16 Percherons, 13 Hunters, 5 Yorkshire Coach Horses, 3 Cleveland Bays, 2 Welsh Roadsters and 1 American Trotter.

The number of stallions rejected was 125, of which 97 were Shires, 8 Clydesdales, 7 Thoroughbreds, 7 Suffolk Punches, 3 Hackneys, 1 Cleveland Bay, 1 Hunter and 1 Pony. 75 of the rejections were in respect of stallions which were being examined for the first time, the remaining 50 being those of stallions which had been registered in previous years. The rejections were on account of the following diseases: whistling 33, roaring 32, sidebone 25, cataract 11, ringbone 7, stringhalt 4, bone spavin 4, shivering 3, and defective genital organs 2. One stallion was rejected on account of bad con-

registration. Thirteen appeals were made against the verdict of the examining veterinary surgeons, and five of them were successful.

The National Stud, under the able Directorship of Captain Greer, continues to show a balance on the right side, in spite of the very adverse conditions that have affected the bloodstock industry during the year under review. Fourteen yearlings were sold at an average price of £460; eight mares were drafted and one purchased.

Board's Live Stock Scheme.

THIS Scheme was brought into operation in the spring of 1914, with the object of grading up and improving the ordinary farm stock of the country by educating farmers to the commercial advantages of using good, sound pedigree sires and of keeping records of the milk yields of their dairy cows. For this purpose grants were made last year in respect of 710 bulls, 264 boars, 110 heavy horse stallions and to 25 milk-recording societies.

The close of the current financial year (31st March, 1919) will complete the quinquennial period for which the Development Commissioners agreed to finance the Scheme. Though it is far too early yet to expect any marked improvement in the stock of the country, the Board are satisfied that the Scheme is sound in principle and gives every promise of proving effective in operation. With the consent of the Treasury and the Development Commissioners it has been decided, therefore, that the Scheme shall be continued and be regarded as one of the normal activities of the Board in the future, and that the expenditure thereon shall be borne on the Board's vote and not be a charge on the Development Fund.

It is intended to amend and develop the Scheme as opportunity offers, but no alteration will be made for the year ending 31st March, 1920.

The funds available next year for the award of grants will be approximately £25,000, an increase of £1,000 on the current year's grant, and this has been provided for developing milk recording as it is hoped to extend this important section of

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester, and 1, St. Andrew's Crescent, Cardiff.*

THE following letter (No. C. L. 114/C. 1), was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 1st February :—

Future Organisation of Agricultural Executive Committees.

SIR,—1. The Board have had under consideration the question of the future organisation and work of the Agricultural Executive Committees in view of the signature of the Armistice and of the fact that the powers under the Defence of the Realm Regulations which the Committee have exercised on behalf of the Board will shortly expire and be replaced by the provisions of Part IV. of the Corn Production Act, 1917.

2. The present Executive Committees were appointed early in 1917 by the War Agricultural Committees of the County Councils, with the addition of members appointed by the Board. Under present conditions it does not seem necessary to retain the War Agricultural Committees, but it will be necessary that there should be in each county an Executive Committee who can act as the Board's agents for the administration of the powers of the Board under Part IV. of the Corn Production Act. These Committees will be responsible to the Board and their expenses will be paid by the Board, They cannot, therefore, be statutory Committees of the County Councils, but it is very desirable that they should be constituted in such a manner as will avoid any possibility of friction or duplication of work between them and the statutory Committees of the County Councils who are dealing with agricultural questions, such as the Agricultural Education Committee and the Small Holdings and Allotments Committee.

3. The Board have decided that the best method of securing this object will be to invite the County Councils to nominate a majority of the members of the Agricultural Executive Committees, and they have, therefore, made the Cultivation of Lands (Committees) Order, 1919, of which a copy is enclosed.* This Order provides that the existing Agricultural Executive Committees shall continue in office up to 31st May next, when they will be replaced by new Committees consisting of 12 members, of whom eight shall be appointed by the County Council and four shall be appointed by the Board. Probably some members of the existing Committees after two years of incessant work may wish to retire; but I earnestly hope that we may be able to retain the experienced services of the majority. These Committees when constituted will exercise the powers under the Defence of the Realm Regulations so long as they remain in operation, and when those powers expire the Committees will be appointed to act as the Board's agents for the purposes of Part IV. of the Corn Production Act, 1917, in accordance with the provisions of Section 11 (2) of that Act. The Board are sending a copy of this letter to the County Councils with the request that they will nominate their proportion of the new Committees, and as soon as the Board have received the names of

4. Pending the appointment of the new Committees, the present Committees should continue their work, but the Board desire to take this opportunity of stating the policy which the Committees should adopt during the next few months and of indicating some of the modifications which should be made in the scope of their activities.

5. *In the first place, the Board desire to emphasise the fact that* although the conclusion of the Armistice has relieved materially the food situation, it is *still* a matter of great national importance to produce as much food as possible at home. It is happily the case that our bread supply for the present cereal year is secured, largely owing to the special efforts of the farmers last year. But for some time to come the production of many Continental countries will fall below the pre-war level, and their demands on the exportable surplus of the World will be very considerable. It is clear, therefore, that if during the next year or two there is a bad harvest in North America there might be very serious difficulty in supplying the needs of the importing countries. *Consequently on grounds of ordinary prudence it is essential* to produce all we can at home so that we may be dependent as little as possible on imports. On the widest grounds of national welfare it is also desirable that a considerable proportion of the population should be employed upon the land, and this employment can only be provided if the maximum output from the soil is attained and maintained. Finally, for financial reasons the adoption of this policy is urgently necessary. As a result of the War the country is burdened with a gigantic foreign debt, and for the purpose of paying off this debt and redressing the adverse balance of trade it is essential that we should increase our own production. It should be the duty, therefore, of the Agricultural Executive Committees to stimulate agricultural production in all possible directions, and under present conditions the Board are of opinion that the most effective method of doing so will be to endeavour to secure maximum yields from the existing arable land, and at the same time to make special efforts to improve those pastures and meadows which, from the texture of the soil, or from their superior quality, their altitude or their liability to flooding, will probably always remain grass. A great field of work can most usefully be undertaken in this direction, as there is little doubt that in most districts the grass land is *much less well farmed than the arable.*

6. Until demobilisation of the Forces has been completed and normal conditions have been restored, the question of the supply of labour for the land is likely to be uncertain and difficult. On this ground alone, apart from other considerations, the Board have come to the conclusion that it would be undesirable at present to compel farmers generally to increase their liabilities by requiring any considerable extension of the tillage area through the conversion of more grass land to arable. At the same time the Board desire to make it clear that, since the need *for increased production remains*, Committees should not abstain from requiring farmers to plough up grass land in those cases in which it is desirable to change the mode of cultivation so that more food may be produced. The ploughing policy of the Board, adopted as a war measure, has been amply justified and has resulted in a very large addition to the food supply of the nation. Where the local conditions are favourable where labour is available, and where necessary pasturage for live stock has been provided, it is in the national interest that suitable land should be kept or brought under the plough. On the other hand the Board recognise that under the *stress of war* conditions mistakes may have been made, and that cases have occurred where land was ploughed up

which it is not desirable to retain permanently under the plough. Committees should offer no objections and should, indeed, encourage the seeding-down of this land to grass as soon as it can be properly prepared for sowing. But it is hoped that, wherever possible, more suitable land for the plough may be substituted, in order that the total arable acreage may not be reduced.

7. It is the earnest desire of the Board that the increased arable area which has been secured should be maintained and that we may never again relapse into the state of affairs before the War when the food supply of the nation was to such a large and dangerous extent derived ro m other countries.

8. The principal duties of the Committees, therefore, during the present year should be to consolidate their gains and to use every effort to improve the general standard of farming, so that the production of all forms of agricultural produce may be increased to the maximum.

9. This policy involves some reconsideration of the arrangements for the survey which the Department asked the Committee to undertake in their letters of the 27th September, and 10th October last. When those instructions were issued it seemed probable that the War would continue for many months, and it was necessary as an immediate measure of national defence and insurance to make preparations for the possibility that a further large addition to the tillage area would be essential to safeguard the food supply. The survey was, therefore, designed with the principal object of classifying all the grass land in the country, so that, if it proved necessary, ploughing orders could be issued without delay. The signature of the Armistice has, however, so far modified the situation that under present conditions the Board have come to the conclusion that a complete classification of grass land is not immediately necessary. In counties where such progress has been made with the survey, that it can be readily completed, it should be finished, if necessary, with professional assistance. But, speaking generally, the Board think that Committees should now concentrate themselves on surveying those farms which are insufficiently cultivated, in order that any necessary action may be taken to raise the standard of farming.

10. The signature of the Armistice also made it necessary to consider the position of the tractor and horse schemes and the staff and administrative expenses of the Committees. The Board have received indications from several Committees that in their opinion farmers will soon be able to do their work independently of the assistance of Government tractors and horses, and the heavy expense of direct Government cultivation makes it highly desirable to replace the present schemes by private enterprise without delay. The Board have decided, therefore, that arrangements should be made as soon as possible after the spring cultivations are over to dispose of all the Government tractors and horses for use on the land. Detailed instructions on the subject will be sent to you shortly by the Cultivation Division of the Department, but it was considered desirable that the Committee should have early notice of the Board's intentions, so that they should not enter into fresh commitments or undertake contracts which cannot be completed before 31st May.

11. The limitation of the survey and the disposal of the tractors and horses will enable a very considerable reduction to be made in the staff and administrative expenses of the Committees. The Board would be glad to receive at once a statement giving particulars of the names and salaries of the officers of the Committees whose services can be dispensed with immediately, and the necessary steps should be taken

by the Committees to terminate their engagements by one month's notice. The staff engaged on the tractor and horse schemes should be informed that their services will probably not be required after 31st May. It appears to the Board that it will not be necessary to retain the services of the District Executive Officers after that date and the question of the salaries paid to the Secretaries of the District Committees should also be considered.

12. In conclusion, now that the special war work which the Committees have undertaken is drawing to a close, I desire to express personally and on behalf of the Board our warm appreciation of the unvaried efforts which have been made by the members and officials of the Committees to carry out the policy of the Government. In spite of great difficulties and many discouragements the Committees have accomplished a great work, the fruits of which will remain as a testimony to the patriotism and public spirit of the agricultural community. The Committees have created a link between the farmers and the Government, which it is hoped will not be broken; they have contributed materially to the solution of the grave difficulties in regard to food with which the nation was confronted during the War; and they have succeeded in raising the general standard of farming throughout the country.

13. It is largely due to the work of the Committees that the importance of agriculture in the national economy is much more generally recognised than was the case before the War, and the Board feel that they can rely confidently on the continued co-operation of many of the members and officials in connection with the new Committees which will carry on the work under peace conditions.

I am, etc.,
(Signed) R. E. PROTHERO.

THE Board of Agriculture and Fisheries have made an Order (No. 73), dated 25th January, 1919, to the effect that:—

The Cultivation of Lands (Committees) Order, 1919.

1. On the appointed day the provisions of the Cultivation of Lands Order, 1918 (No. 2),* as to the reconstitution of bodies to exercise powers conferred on the Board by Regulation 2M, and as to the maintenance by any such body of an Executive Committee, shall cease to operate, and Agricultural Executive Committees constituted in manner prescribed by this Order shall come into office.

2. For each administrative county there shall be constituted an Agricultural Executive Committee consisting, unless the Board by Order otherwise direct, of twelve members of whom eight shall be appointed by the council of the county and four shall be appointed by the Board.

3. In the case of a county in Wales (including Monmouthshire) two of the members appointed by the council of the county shall be the members representing the council of the Welsh Agricultural Council.

4. An Agricultural Executive Committee constituted under this Order may exercise within the administrative county any power which under any Order specified in Part I, of the Schedule hereto may be exercised by or through an Executive Committee referred to in that Order, and any such Order shall have effect as if the Committee constituted under this Order were the Executive Committee referred to in that Order.

* Printed in this *Journal*, September, 1918, p. 718.

5. The Board of Agriculture and Fisheries in exercise of the powers conferred by Regulation 2 R do hereby authorise any Agricultural Executive Committee constituted under this Order to exercise on and after the appointed day within the administrative county any power which under any Order specified in Part II. of the Schedule hereto may be exercised by an Executive Committee referred to in that Order.

6. (i.) The Committee constituted under this Order for any administrative county may, with the consent of the council of any county borough which is surrounded in whole or in part by the county, exercise within the county borough the powers which the Committee is by the Order or any other Order made by the Board under the Defence of the Realm Regulations authorised to exercise within the county or any of such powers, and for the purposes of the exercise of the said powers within the borough the Committee and the council of the borough may appoint in such manner as may be agreed a committee to act as a sub-committee of the Agricultural Executive Committee, but all acts of the sub-committee shall be submitted to the Committee for their approval.

(ii.) The Cultivation of Lands (County Boroughs) Order, 1917,* is hereby revoked.

7. Any notice, direction, licence, or authority issued under any Order specified in the Schedule hereto by an Executive Committee referred to in that Order shall, as from the appointed day, operate as a notice, direction, licence or authority issued by an Agricultural Executive Committee constituted under this Order.

8. The appointed day for the purposes of this Order shall, unless the Board by Order or otherwise direct, be the 31st May, 1919.

SCHEDULE.

PART I.

The Cultivation of Lands Order, 1918 (No. 2.)†

The Cultivation of Lands (Allotments) Order, 1918.‡

Orders under Regulation 2M relating to one or more counties or county boroughs only.

PART II.

The Rookeries Order, 1917.

The Rabbits Order, 1917.||

The Destruction of Pheasants Order, 1917 (No. 2).§

THE following Notice was issued by the Food Production Department of the Board on 14th February:—

Feeding Value of Rye Grain.

Until recently rye grain might only be used for human food; it may now be used for any purpose. Stock-keepers, therefore, should look to rye as a means of supplementing the short supplies of the standard feeding-stuffs. In general composition rye closely resembles wheat, but it is not quite so appetising, nor is it so suitable for meat or milk production. It is best adapted for working animals, or for other animals getting plenty of exercise. It should, at first, be given only in small quantities and along with other foods, but it should not be fed unless it is in sound condition and comparatively free from ergot. Ergot was fairly common in rye last year; after

* Printed in this *Journal*, December, 1917, p. 1,009.
† See footnote on p. 1362.
‡ See this *Journal*, November, 1918, p. 992.
|| Printed in this *Journal*, June, 1917, p. 369.
§ See this *Journal*, June, 1917, p. 370.

threshing, most of the ergot will be found in the screenings. As ergot may cause abortion no rye screenings should be fed to pregnant animals if there is any suspicion that ergot is present. A typical ergot in rye is an elongated, slightly-curved, purplish-black body about half-an-inch long and one-eighth broad; when broken the inside is of a dirty-white appearance.

The quantity of rye fed to horses should not at first exceed one-fifth of the total grain ration, but this may be gradually increased to one-third if care is taken to ensure that the rye is thoroughly masticated, by crushing and mixing it, for instance, with chaffed hay or straw. Cows may receive up to 3 lb., sheep up to ½ lb., and pigs according to age up to 3 lb. per head per day. For pigs, ground rye should be fed in a thin slop or mixed with chopped potatoes, mangolds, or other roots.

THE Food Controller has recently issued two Notices under the Cattle Feeding Stuffs (Maximum Prices) Order, 1918*:—

Notices Issued under the Cattle Feeding *Stuffs (Maximum* Prices) Order, 1918.

1. *Order No.* 57 *of* 1919.—This prescribes that on and after the 27th January, 1919, the maximum price for compound cakes and meals (made from two or more ingredients where no oil is expressed in the process of manufacture) shall be either—

(i.) A price not exceeding by more than 50*s*. per ton, or such other amount as may from time to time be prescribed by the Food Controller, the total of the cost to the maker of the ingredients used as delivered at his factory; or

(ii.) A price not exceeding the highest maximum price for the time being in force under the principal Order for home manufactured cake and meal,

whichever shall be the lower price.

2. *Order No.* 119 *of* 1919.—This orders that as from 10th February, 1919, the Notice† varying the maximum price of flour millers' offals issued under the principal Order be revoked, and prescribes that as from 10th February, 1919, until further notice the maximum price on a sale of flour millers' offals shall be:—

(*a*) On a sale of fine flour millers' offals £14 10*s*. per ton.

(*b*) On a sale of coarse flour millers' offals £13 10*s*. per ton.

And that if any question arises as to the meaning of the words "fine" and "coarse" as hereby applied to flour millers' offals, such question shall be decided by the Flour Mills Control Committee.

Two Army Council Orders have been issued recently which came into force on 1st February, 1919, and have the following effect:—

The Removal of Certain Straw Restrictions.

All restrictions upon the sale, use of, or removal of straw are removed (subject to the provision of the Waste of Forage Order, 1918), except in those cases where purchases have already been made on behalf of the Army or Civil Supplies.

In future straw will *not* be invoiced through the County Distributing (Forage) Committees as heretofore, but will be invoiced by the producer or grower to the wholesale dealer, retailer or consumer, as the case may be at the price at which the straw is actually bought, and such invoiced

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* Printed in this *Journal*, March, 1918, p. 1474.

price must be the basis upon which all subsequent sales are made. These prices must not exceed the maximum stack prices set out in the Army Council Order, dated 20th August, 1918,* which are as follows :—

Oat, barley, rye, bean and pea straw and threshed tares, 1918 crop, £3 15*s.* per ton ; 1917 or earlier crops, £3 6*s.* per ton.

Wheat, revit wheat, buckwheat, and mustard straw, 1918 crop, £3 per ton ; 1917 or earlier crops, £2 15*s.* per ton.

In addition to the above prices for the 1918 crop, interest at the rate of 10 per cent. per annum may be added to the price at which the straw is sold by the producer, calculated from 1st January, 1919, to date of completion of lifting.

A wholesale dealer will be entitled to add to these prices the sum of 1*s.* 6*d.* per ton for buying charges, in addition to such other charges as are applicable.

A producer who sells straw direct to a consumer will not add the buying charge of 1*s.* 6*d.* per ton to the invoiced price, but he may add such other charges as are applicable. (*Board of Trade Journal*, 6th February, 1919.)

Control of Eggs.

THE Food Controller does not purpose importing or pickling eggs this year, as he desires to leave the matter in the hands of the trade. With regard to prices, control will have to remain until the price of eggs is reduced automatically to somewhere near its normal by increased supplies (*National Food Journal*, 12th February, 1919.)

Demobilisation of Agriculturists.

THE names of 30,000 agriculturists have been forwarded by the Board of Agriculture to the Department of Demobilisation and Resettlement for early release from the Colours as "pivotal" men in agriculture. It is understood that the demobilisation of these men is being expedited.

Agriculture has recently been granted a higher degree of priority in the Demobilisation Scheme, agriculturists now ranking for release equal with coalminers. Now that the majority of coalminers have been released, the dispersal drafts being sent forward will doubtless contain a large percentage of agriculturists. The records of the Military Authorities show that 54,000 agriculturists, including "pivotal," "contract," "slip" men, etc., had been demobilisedup to February 12th. An Army Council Instruction issued in January allowed any agriculturist serving at home, whatever his medical category, to be attached to an Agricultural Company, pending his demobilisation. Over 12,000 men have been sent out to their former employers on furlough under this procedure.

Unless he has already done so, every farmer should take measures at once to get back any men whom he desires to employ and who are now with the Forces. The first thing for the farmer to do is to register such men as having employment ready for them immediately they are demobilised. Men who were in the farmer's employment on or before 4th August, 1914, should be registered as "contract" men. Other men who were not in the farmer's employment before the War should be registered as "slip" men.

Registration can be made at any Employment Exchange. All that need be done is to write out and fill in the date and signature to the

* Printed in this *Journal*, October, 1918, p. 890.

following declaration, and send it to the nearest Employment Exchange :—

"I/We (full name and postal address of employer) hereby declare that (full name and naval or military number and address of employee) was in my/our employment before 4th August, 1914, and that I/We are prepared to offer him employment as a (name *and occupation) immediately on his return to civil life* (or *give the* date after which the employment will be available)."

Farmers should write the name and other particulars of the man to be registered and also their own name and address as plainly as possible, and should refrain from adding to the information required any *irrelevant matter. If the declaration here given is carefully and* accurately filled up and sent to the Employment Exchange the farmer may rely upon the matter receiving immediate attention.

The above applies to men who were in the farmer's employment before the War. In the case of other men he desires to employ he should *obtain a card (E.D. 406) from the Employment Exchange,* complete it with the man's particulars and return it to the Exchange.

It is useless, however, to adopt this procedure in the cases of men who have joined up since 1st January, 1916, as these men are not available for demobilisation at present, being required for the Army of Occupation.

THE following Memorandum (No. C.L. 161/L. 2) was addressed to Agricultural Executive Committees by the Food Production Department of the Board on 14th January :—

Agricultural Labour: Functions of Sub-Committees in Demobilisation.

1. The Government has decided that the Local Advisory Committees of the Ministry of Labour, Employment Department, are to be the responsible local bodies for dealing with the resettlement of labour on discharge from war jobs or on return from the Forces to civil life. These Advisory Committees have been advised to appoint, for each of the larger and well-organised industries in the locality, a "Trade Sub-Committee" to undertake work in connection with finding employment for men and women in the industry concerned.

2. The Board have arranged with the Ministry of Labour that the "Trade Sub-Committees" for the agricultural industry should be the Labour Sub-Committees of the Agricultural Executive Committees.

3. It is proposed that in the first instance, as far as the Employment Department is concerned, their responsibility for dealing with agricultural labour should be centralised at a single Employment Exchange in each county, so that for agricultural purposes the area of the Local Advisory Committee associated with such Exchange will be extended to cover the whole of the county and so will be identical with the area of the Agricultural Executive Committee.

4. A list of the Employment Exchanges with which Agricultural Executive Committees will deal in this connection is attached.*

5. In order to secure complete co-operation between the Labour Sub-Committee and the Local Advisory Committee of the Employment Exchange, the Ministry of Labour will appoint, where they consider it necessary, an Officer of the Employment Exchange to act with the County Labour Officer as Joint Secretary of the Sub-Committee in connection with the placing of civilian labour in agriculture. The [illegible]-Committee will, of course, continue to act solely under

* Not here printed.

the general direction of the Agricultural Executive Committee, and will collect, as hitherto, information as to the vacancies for agricultural workers that exist in the county. Civilians seeking agricultural employment will be dealt with at the Exchange, and it will be the simplest procedure for the Labour Officer to attend at the Exchange to peruse the particulars of applicants, interview them when necessary, and with his knowledge of the existing vacancies arrange with the Employment Exchange Manager to what farmers the men can best be offered. The *fullest interchange of information* between the Labour Sub-Committee and the Employment Exchange will be essential.

6. The arrangement outlined in this Memorandum will be extended to all the activities of the Employment Exchange in connection with agricultural labour and the demobilisation of men now with the Forces. For instance, the Labour Sub-Committee, or an Agricultural District Committee acting in that behalf by arrangement with the appropriate Local Advisory Committee, will be the body that will advise the Local Advisory Committee, *e.g.*, upon the endorsement of offers of employment under paragraph 5 of the recent announcement of the Controller-General of the Department of Demobilisation and Resettlement, a copy of which has been sent to all Committees (see C.L. 159/L. 1, dated the 19th ultimo.)*

7. In connection with these arrangements the Board would be glad if Agricultural Executive Committees would reconstitute their Labour Sub-Committee where necessary. Such Committees should contain at least one representative of the Women's Agricultural Committee and an equal number of representatives of the farmers and the agricultural labourers. The District Wages Committee should also be invited to nominate one representative. In some instances, the existing Local Advisory Committees of the Employment Department contain representatives of farmers and agricultural workers, and, as far as possible, these gentlemen should be added to the Labour Sub-Committee.

8. A Memorandum with reference to the proposals set out above is being issued to Local Advisory Committees by the Ministry of Labour and the Board trust that all Committees will communicate as to these arrangements with the Local Advisory Committee attached to the Exchange with which they are associated.

THE following Notice was issued by the Food Production Department of the Board in January :—

Land Settlement for Soldiers.

A large number of applications are being received at the Board of Agriculture, 4, Whitehall Place, S.W. 1, for the official pamphlets, entitled "Land Settlement in the Mother Country," which have been issued by the English and Scottish Boards of Agriculture jointly with the approval of the Admiralty and the War Office. Two pamphlets have been printed, one intended for officers (L.S. 9), and the other for men (L.S. 8)†. The object of each is to explain the steps that have been or will be taken to settle ex-service men on the land after the War, and to explain impartially the prospects

* Not printed in this *Journal*.

† See this *Journal*, January, 1919, p. 1152; also this issue, p. 1311.

of success of those who desire to take up farming or market gardening in the Mother Country.

It is pointed out that the conditions of agricultural life in this country are already widely different from what they were before the outbreak of war, Great Britain being to-day more nearly in the position of a self-supporting country than she has been for the last 40 years. The Government state that it is their desire and intention to maintain and extend so far as possible the revival of agriculture which has been brought about by the necessities of war. In order that the land of this country may be put to the fullest possible use for the benefit of the nation as a whole, it is necessary that as many individuals as possible should have a direct interest in the cultivation of the soil. Steps are, therefore, being taken to provide for the settlement on the land, either as owners or occupiers, of men possessing experience and qualifications.

One of the most difficult problems in connection with the provision of land for ex-service men is to estimate the possible demand which is likely to be made by sailors and soldiers in the course of the next year or two. Extensive inquiries with regard to this are already being made in France and other theatres of war, and particulars available at present indicate that the demand will be very large indeed. In fact it will probably prove to be physically impossible to acquire, adapt and equip sufficient land to satisfy the total number of likely applicants. At all events, sufficient is already known of the dimensions of the problem ahead of the Government to make it perfectly clear that only by delegating the duty of acquiring and equipping land for small holdings to Local Authorities throughout England and Wales will it be possible to obtain results on an adequate scale in the time available. The great majority of the small holdings available for ex-service men will, accordingly, have to be provided by the County Councils.

It must be remembered that before the War the County Councils had had considerable experience in the establishment of small holdings and the selection of suitable tenants. In the seven years, 1908-14, they acquired approximately 180,000 acres of land in England and Wales and placed over 12,600 small holders in possession of it. Moreover, these holdings have proved self-supporting and practically no charge in connection with them has fallen upon the rates. It will be admitted that these figures represent only a mere fraction of what has now to be taken in hand, but it is satisfactory to know that the machinery to undertake this work is already in existence, and in the past has proved its success. Any man who desires to obtain, after demobilisation, a small holding of not more than 50 acres in England or Wales should, therefore, fill up the form printed in the booklets referred to above, and forward it to the Clerk of the County Council of the county in which he wishes to settle.

It is obvious that in the interests of the men themselves, as well as of the nation as a whole, it will be necessary for the applications to be considered very carefully in order to avoid men being placed in small holdings who have not yet acquired sufficient practical and technical knowledge to make a success of the venture. Such a course would only lead to disappointment and cause a set-back to the whole movement. From every point of view it is desirable that the first men to be settled in small holdings should be possessed of adequate
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movement, and by their success prove a source of encouragement to others, who, not having had previous experience in the management of land, will be assisted as soon as they are demobilised to secure employment with a good farmer. The conditions of employment in agriculture have, of course, been very greatly changed during the War. District Wages Committees have been established throughout the country, and the agricultural labourer has the assurance of a due reward for his toil. In no county of England and Wales has a lower rate than 30*s*. for a week of 54 hours in summer and 48 hours in winter been fixed for any labourer over 18 years of age. The Government are already engaged in organising training facilities for ex-service men which will enable them to secure employment at the wages mentioned.

THE following Circular Letter was addressed to County Councils and Councils of County Boroughs by the Food Production Department of the Board on 14th January :—

Land Settlement: Circular Letter to County Councils.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to inform you that he is now in a position to supplement the information given in the Board's Circular Letter of the 18th December* last as to the financial arrangements for the settlement on the land of ex-service men.

2. The Government have come to the conclusion that while the County Councils are the most suitable bodies to be entrusted with the local administration of the matter, the financial responsibility for the loss which must inevitably occur in creating small holdings under present conditions should be borne by the Exchequer and no charge should be placed on local rates.

3. The Board have, therefore, been authorised to inform County Councils that, subject to their obtaining the approval of the Board to (1) the price or rent to be paid for any land acquired, (2) the scheme for the adaptation and equipment of the land, and (3) the rents to be charged to the small holders, the Board will repay to the Council the whole of the deficiency between revenue and expenditure on the small holdings undertaking of the Council as a whole, including the land already acquired. The repayments will be made at the end of each financial year up to and including the 31st March, 1925. This guarantee will apply to all approved schemes which shall have been submitted by the Council to the Board prior to 1st December, 1920. After this date the position will be reconsidered as regards any subsequent scheme.

4. After the 31st March, 1925, it is intended that a valuation should be made of the whole small holdings property of the Council. Any difference between the outstanding amount of the loans and the valuation will be written off by the State as irrecoverable, and the Council will then take over the whole responsibility for the property at the valuation price without any further control by or assistance from the State.

5. The Board feel sure that your Council will recognise that these arrangements will be effective in securing that no part of the loss incurred in carrying out a natio[illegible]

rates. They will also have the advantage that the whole of the financial assistance from the Board will in future be given under one head, and will obviate the detailed accounting work of making separate claims to the Board in respect of one-half of the cost of ascertaining the demand for small holdings, one-half of the irrecoverable loss on each scheme taken separately and in respect of the expenses incurred in relation to the acquisition of land.

6. Legislation will be introduced as soon as possible to give statutory effect to the above arrangements, and also with the object of making such other amendments in the Small Holdings and Allotments Acts as experience has shown to be desirable.

7. As the whole of the financial responsibility has been assumed by the State, the Board feel confident that they can rely on the active assistance of your Council in carrying into effect without delay the desire of the Government to settle on the land of this country as many as possible of the ex-service men who are qualified to become successful small holders. The Board will be glad to receive at the earliest possible date concrete proposals from your Council for the acqnisition of suitable land for the purpose, and I am to point out that the matter is one of great urgency in view of the approaching demobilisation of the Forces.

8. A further communication will be sent to you shortly as to the source from which loans will be made, but I am to say that under present conditions the rate of interest is not likely to be less than 5½ per cent. In submitting their schemes, therefore, Councils should furnish estimates of the annual expenditure on the basis of the cost of the land and equipment at present prices with a 5½ per cent. rate of interest on loans and of the annual revenue from rents, which should be fixed at such amounts as represent the fair rental value of the holdings. The Board feel sure that Councils will be vigilant guardians of the public funds which they will administer, and that they will exercise all possible care and economy with regard to the price to be paid for the land, the expenditure on equipment and the cost of administration.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

National Seed-Testing Station.

Oats and Barley for Seed Purposes.—The Seed-Testing Station of the Food Production Department have recently reported that they are receiving a number of samples of oats and barley which have been heated in the stack. In some cases the germination of these samples has been only abont 20 per cent., and in the majority of cases the germination has not been more than 60 or 70 per cent. It is not by any means always possible to detect this inferior capacity for growth by inspection of the sample. Farmers are, therefore, urged to exercise considerable caution before relying on grain for seed that has been taken from stacks which may have become heated.

In all cases of doubt as to the soundness of the grain, samples should be sent to the Seed-Testing Station to be tested before the seed is sown. Samples should be not less than . oz. and should be addressed

to the Food Production Department, 72, Victoria Street, London, S.W. 1. Envelopes for the purpose of sending samples may be obtained free of charge at the above address. A fee of 3*d.* should accompany each sample when the farmer requires the report for his own information, or 1*s.* if he wishes to make a declaration in respect of a sale.

Seed-Testing Figures.—During the year 1918, 14,569 samples of seeds were tested. During the first five months of the Station's second season, namely, 1st August, 1918, to 31st December, 1918, 8,185 samples were tested. Of these, 3,397 samples were wheat; 784 samples were oats. This season peas and vegetable seeds are being received in far greater quantity than last season. As showing the popularity with the trade already obtained by the Station, it may be mentioned that upwards of 160 seed firms have opened deposit accounts.

The Germination of Seeds.—As a result of conferences between representatives of the seed trade and the Food Production Department, it is proposed to fix official standards of germination for certain root seeds. When this is done germination standards will have been fixed for all seeds affected by the Testing of Seeds Order* with the exception of grasses and clovers.

Supplies.—A census of stocks and prospective supplies of agricultural and garden seeds in England and Wales recently taken by the Board of Agriculture indicates that, with a few relatively unimportant exceptions, ample quantities are available to meet the estimated demand for sowing this spring. The need for continued economy in the use of seeds should not, however, be overlooked. Allotment holders and other growers should calculate their seed requirements with care in order to prevent waste.

Purchasers are reminded that under the Testing of Seeds Order, seedsmen are required to disclose certain essential facts regarding the quality of the seeds they sell. Standards of germination and purity are specified in the Order and small packets of vegetable seed falling below these standards must be so declared. An implied guarantee that the seeds are up to or above the standards specified in the Order is therefore given with all packets of vegetable seeds affected by the Order unless the seller makes a declaration to the contrary at the time of sale. (See also article at p. 1328.)

Corn Growing in Late and Wet Districts.

As the result of inquiries made by the Food Production Department the following cultural hints and suggestions, based on the experience of farmers accustomed to late and wet districts, are issued with a view to assisting farmers now growing corn for the first time under the conditions referred to.

The first essential is sound, well-harvested seed, free from any suspicion of heating. If any donbt exists on the point a sample should be submitted for examination to the Government Seed-Testing Station, 72, Victoria Street, S.W. 1. Next, the farmer should aim at securing an early harvest—

(1) By sowing an early ripening variety suited to local conditions of soil and climate. For advice on this point application should be made to the Headquarters of the Agricultural Educational Staff of the

* Printed in this *Journal*, July, 1918, p. 477.

County or to the Food Production Department, 72, Victoria Street, S.W. 1.

(2) By the application of phosphates, preferably superphosphate, at the rate of 2 to 3 cwt. per acre at seed-time, with the addition, where the soil is poor, of ½ to 1 cwt. per acre of sulphate of ammonia.

(3) By obtaining seed from an early district, *e.g.*, the south-eastern counties. The adoption of this or the previous expedient may advance harvest by 10 days or a fortnight.

Mustard Growing: Restrictions Removed.

THE Food Production Department made an announcement on 24th January, which will give satisfaction to a considerable number of farmers in the Eastern Counties, namely that the restrictions imposed some time ago on the growing of mustard for seed have been removed.* The decision of the Food Production Department to make an Order prohibiting the growth of mustard for seed without a licence, and limiting the total area to 20,000 acres in England and Wales, was a war measure conceived in the interests of essential food production, and was arrived at prior to the conclusion of the Armistice. Recently representations were made from several of the Executive Committees in the principal mustard-growing counties that a larger acreage might safely be allowed, and in view of the improved situation with regard to food supplies, consequent on the suspension of hostilities, the Board of Agriculture have decided that it is not necessary to continue the restrictions on the growth of mustard for seed which have been enforced during the last two years. Accordingly, the recent Order has been revoked and all restrictions on the use of land for the growing of mustard for seed are now removed. There will be a considerable demand for mustard seed for export after the next harvest, and, in the view of the Board it is in the national interest that farmers should be free to grow what is likely to be a very profitable crop without the necessity of having to obtain a licence from the county Agricultural Executive Committee.

THE following Notice was issued by the Food Production Department of the Board on 31st January:—

Selected Seed Potatoes.

As part of its scheme for preventing the spread of Wart Disease, the Board of Agriculture arranged last year for the growth of a certain quantity of seed of immune varieties by Scottish growers. The crops were carefully "rogued," under the supervision of the Department's Inspectors, and specially selected. They are being sold through agents in different parts of England and Wales and a limited amount of seed remains on offer. The varieties represented are Ally, Lochar, Kerr's Pink, Dominion, Majestic, and Tinwald Perfection. Intending growers of potatoes in infected areas who have not yet secured their seed will be well advised to make early inquiries from the Commercial Secretary, Board of Agriculture, 72, Victoria Street, London, S.W. 1.

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* See Note in this Journal, January, [illegible]

The Suppression of Wart Disease.

IF the Board of Agriculture is to be successful in its effort to combat the spread of Wart Disease of Potatoes, it is essential that the co-operation should be secured alike of the dealers in potatoes and the growers of potatoes. The Wart Disease of Potatoes Order* prohibits the sale of potatoes of an approved immune variety except by persons authorised by a licence, unless the sale is direct to a dealer in seed potatoes. All registered dealers must understand the necessity of obtaining a licence to deal in seed potatoes of approved immune varieties. The Food Production Department has published a list of these varieties, which can be obtained free from the Board of Agriculture, 3, St. James's Square, S.W. 1. Only these varieties may be planted in areas certified as infected with Wart Disease. When buying seed potatoes of these varieties the public should make a point of being assured that the person from whom they buy is a registered dealer and authorised to sell such seed. Small growers who may be tempted to protest against interference with their freedom of choice will do well to realise that the precautions which the Government is taking are in their special interest as well as to the national advantage. To prevent the spread of Wart Disease it is most important that the seed supplied for planting in infected areas shall be what is known as "true to type" and "free from rogues." If impure stocks of an approved variety are planted a premium is placed on further outbreaks of the disease. In past years impure stocks have been sold to allotment holders and others and serious losses have resulted in consequence to large numbers of persons of modest means. Moreover, the disease has been carried into areas hitherto regarded as free from infection. Obviously, it is to the benefit of all growers and traders to assist the Board of Agriculture in carrying out a scientific campaign against the development of one of the most serious perils to profitable potato-growing.

Wart Disease of Potatoes Order of 1918: Circular Letter.

THE following Circular Letter (No. C.L. 53/S.3) was addressed to Local Authorities in England and Wales under the Destructive Insects and Pests Acts, 1877 and 1907, by the Board on 7th January :—

SIR,—I am directed to refer to the Circular Letter (No. 27/S. 3),† addressed to Local Authorities on the 29th April last on the subject of the Wart Disease of Potatoes Order of 1918, and to say that the Board desire me to call the attention of your Local Authority to Art. 4 (1) of the Order, which prohibits the sale of potatoes of an approved immune variety except by persons authorised by a licence granted by the Board, unless the sale is direct to a dealer in seed potatoes. The object of this requirement is to ensure that the seed supplied for planting in infected areas shall be true to type and free from rogues, since the planting of impure stocks will inevitably result in further outbreaks of the disease. Licences are only issued, therefore, for the sale of stocks in respect of the purity of which the Board are able to secure satisfactory evidence, and they will take a serious view of any

unauthorised sales of approved immune varieties which come under their notice.

It is desirable that all registered dealers shall be made aware of the necessity of obtaining a licence to deal in seed potatoes of approved immune varieties, and it will be of great assistance if your Local Authority will be so good as to arrange for their officers to take every opporfunity of bringing the matter before the notice of the persons concerned in their district.

Copies of the List of Approved Immune Varieties and of the Wart Disease of Potatoes Order of 1918 will be supplied on application.

I am, etc.,
(Signed) PERCY G. DALLINGER.
For Commercial Secretary of the Board.

THE following Note was issued by the Food Production Department of the Board on 31st January :—

The Ventilation of Potato Pits.

Serious losses have occurred this season in the pits of potatoes in various parts of the country. The Board of Agriculture advise growers to examine their pits at once. Where these are heated, the owner should either turn, dress, and reclamp ware and seed separately or adopt a system of ventilation—

(1) By making ventilation holes about 1 ft. square along the bottom and on both sides of the pit. At the same time the whole ridge of the pit should be uncovered. The bottom of the ventilation holes should be sloped so that rain runs away from, and not into, the pit. During very severe weather these ventilation holes should be filled with loose straw ; or

(2) By removing the soil from the side of the pit, in strips 1 ft. wide, extending from the ridge to the base on both sides of the pit at distances of every 10 yards. The ridge of the pit should also be uncovered. During very severe weather these ventilation spaces should be filled with straw.

By ventilating the pits in one or other of these ways, it is hoped that the temperature will be kept normal ; and that the gases developed in the pits will be replaced by fresh air.

THERE is some ground for thinking that all farmers are not conversant with their rights under this Order.*

Calves (Sales) Order: Farmers' Rights.

Where a calf is offered by auction in a market, the farmer may, if he is not satisfied with the price offered, take the animal away again. It is also open to him to sell to the Government buyer in the market at the maximum price of 20*s.* per calf, or to send his calf to a Government authorised slaughter-house for sale on the dead-weight basis.

Where calves are consigned to a Government slaughter-house, the sender should make arrangements for the necessary feeding and watering in transit. Several prosecutions for cruelty have recently been in-

THE following Notice was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food on 15th January :—

Sale of Pregnant Animals.

The attention of farmers is drawn to Clause 1*a* of the "Live Stock Sales Order,"* which provides that no person shall bring or send or cause to be brought or sent to any market for sale for slaughter or sell or buy for slaughter or cause or permit to be slaughtered any in-pig sow of any age, in-lamb ewe of any age, or in-calf cow or in-calf heifer.

If a farmer offers for sale or slaughter a pregnant animal he becomes liable for prosecution under this Order, and it is urged that farmers should take every care to ensure that animals marketed by them for slaughter are not in this condition.

Provision of Feeding-stuffs.

ARRANGEMENTS are being made for an early distribution of cake or meals for ewes lambing before the end of April. There will be an allowance of 42 lb. per ewe, which is equivalent to about ½ lb. per day for three months. Forms will be issued to farmers registered under the present cattle feeding-stuffs distribution scheme† early in January. Any farmer not registered under that scheme should apply for a form of application to the Live Stock Commissioner for his area or to the Chief Live Stock Commissioner, New County Hall, S.E. 1.

While every endeavour will be made to provide linseed cake, no guarantee can be given that this particular variety will be provided in every case.

The Food Controller has been requested to furnish an allowance of feeding-stuffs for goats. Certain quantities of bran are not required under the distribution scheme, and may therefore be sold and bought without certificates. Goat-keepers should, generally speaking, find no difficulty in obtaining the necessary supplies. Those who are unable to purchase supplies may, however, communicate with the Live Stock Commissioners for their areas or with the Chief Live Stock Commissioner, New County Hall, S.E. 1, when a certificate will be issued entitling them to obtain bran at the rate of 1½ lb. for goats in milk and 1 lb. for billy goats during the next three months. (*National Food Journal*, 8th January, 1919.)

The Cattle Feeding Stuffs (Distribution) Order, 1918: General Licence.

THE Food Controller has made an Order (No. 18), dated 16th January, 1919, providing that where a person who is named as a supplier in any certificate or certificates granted under the Cattle Feeding Stuffs (Distribution) Order, 1918,‡ has supplied or has made provision for the supply of such quantities of any class of cattle feeding-stuffs as are mentioned in every such certificate, he may, without regard to the restrictions imposed by this Order, dispose in such manner as he

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* Order No. 517, dated 8th May, 1918. This Order was not printed in this *Journal*, but a Note respecting its main provisions was published in the issue for June, 1918, p. 350.

† Published in this *Journal*, November, 1918, p. 1008.

shall think fit of the residue of such class of cattle feeding-st remaining in his hands, and such cattle feeding-stuffs may be acqui by any other person accordingly, and the General Licence dated 18th December, 1918 (S.R. and O. No. 1671 of 1918)*, is revoked.

The Dredge Corn Order, 1917: General Licence.

THE Food Controller has made an Order (No. 94), dated 2 January, 1919, providing that notwithstanding the provisions of Dredge Corn Order, 1917,† the Food Control authorises that as from 10th February, 19 until further notice such dredge corn consists of a mixture of cereals grown togetl and containing more than one cereal as a m constituent may be used for the purpose of feeding live stock.

Removal of Restriction Relating to Straw.

THE Army Council has made an Order cancelling the Order of 3 July, 1918‡ (which prohibits the lifting and using of hay and straw England and Wales) in so far as it relates all oat straw, wheat straw, rivet wheat stra buckwheat straw, barley straw, musta straw, rye straw, pea straw, bean straw, a threshed tares in respect of which no purchase note has been signed 1st February.

This forage is, therefore, released. The Order of 20th August la (which prescribed maximum prices for hay and straw) and the Ord amending it are not affected by the new Order.

Fertilisers.

THE following Notice was issued by the Joint Committee of t Board of Agriculture and the Ministry of Food on 15th January, 1919 :

The position as regards the export fertilisers from this country is that in the c of sulphate of ammonia some comparativ limited quantities are allowed to go to France, Belgium and ot Allied countries, and to the sugar-producing colonies. Consideral export of nitrate of soda is also taking place from stocks accumulat by the Government for explosive purposes. Supplies for farme use are available from the same source. In the case of superphosphat some limited quantities are being authorised on the understandi that the quantities so allowed are replaced by the manufacture an equivalent amount of phosphate from coprolites produced in t country. No export of basic slag is allowed, but castor meal a leather meal in excess of the home demand are being sent to Alli countries, viz., France and Belgium.

With regard to the general position, the total supply of sulphate ammonia during the present fertiliser season will be fully sufficient et all requirements and in excess of the quantity available last ye e supply of superphosphate is also ample and likely to be apprecial re than last year. Complaints as to the supply of basic slag are bei

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* Printed in this *Journal*, January, 1919, p. 1238.

† See this *Journal*, December, 1917, p. 1028; November December, 1918, p. 1135.

‡ Printed in this *Journal*, September, 1918, p. 747.

received, but these are due to the excessive demand arising early in the season. The total output will probably be 20 per cent. more than last year, and up to the present the actual deliveries to dealers and farmers have been 16 per cent. greater. The forwarding instructions to makers have, however, been much in excess of the production. There are practically no stocks and the output is being despatched from the works as it is being produced.

Considerable quantities of bone and bone meal are now available at prices which compare very favourably with those of other fertilisers.

Farmers' Supplies: The Fertiliser Situation.

FARMERS will be glad to note that the supply of fertilisers generally for the current season is much greater than it was last year, but, in order to obtain their requirements it is essential that they should place orders with their usual merchants or co-operative societies well in advance of the time when they require delivery. Considerable difficulties still exist in regard to transport, and prompt delivery cannot therefore be assured. The prices prescribed by the Fertiliser Prices Order* for sulphate of ammonia, superphosphate and basic slag will remain unchanged up to the 1st June next, and farmers will gain nothing by postponing their orders till later in the season.

Arrangements have been made for the importation of a considerable quantity of phosphate rock. The demand for basic slag at the present time is greatly in excess of the production, but the total output for the whole season is likely to be about one-fifth more than it was in 1917-18. The slag is being despatched from the works as it is ground. Some approved agents have supplies of basic slag in stock, and farmers who are unable to obtain delivery direct from the works may in certain cases obtain their requirements from merchants' stores. Sulphate of ammonia is available in greater quantities than last year. It is understood that a number of makers have bone meal and bone flour for sale at lower prices than those ruling a few months ago, and immediate delivery of these materials can probably be obtained.

Profitable and Uncommon Fruit.

SOME less-grown fruits are at times worth the attention of allotment-holders with permanent plots. For example, the quince is a fruit that has been in great and increasing demand of late years. Many growers are of the opinion that the trees prefer a cool, moist soil and position. This may be correct, but for a number of years they have borne heavily in exposed positions on poor, sandy soils. In fact, they will succeed almost anywhere if they are given a fair amount of space, and the shoots and branches are not permitted to become too crowded. They should be grown as bush trees, allowing about 12 ft. each way, and given manure only when the trees are fruiting freely. If a rough gale comes when the fruit is about ripe, and blows it down, there is very little or no loss. It does not pay to keep the fruit after the middle of November; decay then begins to set in. The fruit will sell as soon as yellow. There are a number of

varieties, but the common or apple-shaped quince is one of the best, being closely followed by the pear-shaped sort. These two varieties can be especially recommended.

The blackberry known as the Himalayan Giant is worth the attention of the small grower. It grows strongly and will do well on a *tool-shed, or rough fence. It may be grown like the loganberry and* treated in much the same way. All the exhausted, weak or old wood should be cut out in the late autumn, fastening in all the current year's growth that is vigorous, for which there is room for. Every "eye" should send out a stout branchlet, with a mass of blossom producing large, black, luscious berries, giving a great weight of fruit on each plant. Any moderate soil will suit this excellent rambler.

Revocation of Certain Statutory Rules and Orders.

BY *Orders (Nos. 29, 56, and 90) recently issued by the Food* Controller, the undermentioned Orders (among others to which reference has not previously been made in this *Journal*), are revoked, but so that such revocation shall be without prejudice to any proceedings in respect of any contravention thereof.

No. of Order.	*Title of Order.*	Page of *Journal* in which Order was Published.
No. 641 of 1918 ..	The Soft Fruit (Sales) Order, 1918	July, 1918, p. 495.
No. 733 of 1918 ..	The Strawberries (Retail Prices) Order, 1918	July, 1918, p. 498.
No. 936 of 1918 ..	The Plums (Sales) Order, 1918	September, 1918, p. 753.
No. 1053 of 1918 ..	The Blackberries Order, 1918	September, 1918, p. 755.
No. 1054 of 1918 ..	The Damson (Sales) Order, 1918	September, 1918, p. 754.
No. 521 of 1918 ..	The Beehive Section (Maximum Prices) Order, 1918	June, 1918, p. 367.
No. 66 of 1917 ..	The Feeding of Game Order, 1917	January, 1917, p. 1005.

THE *following Notice was issued by the Food Production Depart-* ment of the Board on 24th January :—

Sugar for Bee-keepers.

Bee-keepers will be interested in the arrangement made by the Food Production Department and the Royal Commission on Sugar Supply by which sugar for bees will be available for spring-feeding. It should be noted, however, that this distribution will take place only to bee-keepers who have registered with the Horticultural Sub-Committee of their county. Each registered bee-keeper will obtain from the Horticultural Sub-Committee a certificate which on being presented to the local Food Control Committee will be exchanged for a sugar voucher available for the purpose of sugar from any retail or wholesale dealer.

Distribution of Sittings of Eggs to Small Holders, etc.

ARRANGEMENTS have been made for the distribution of sittings of eggs to small holders and cottagers during 1919* in the following counties :—

England :—
Berkshire.
Buckingham.
Chester.
Cornwall.
Cumberland.
Derby.
Devon.
Dorset.
Durham.
Essex.
Gloucester.
Hampshire.
Hereford.
Hertford.
Isle of Wight.
Kent.
Leicester.
Lincs (Parts of Kesteven and Lindsey).
Norfolk.
Northampton.
Northumberland.
Oxford.
Rutland.
Shropshire.
Stafford.
Suffolk, East.
Surrey.
Sussex, East.
Warwick.
Westmorland.
Wiltshire.
Worcester.
Yorkshire.

Wales :—
Anglesey.
Brecon.
Cardigan.
Carmarthen.
Carnarvon.
Denbigh.
Flint.
Merioneth.
Monmouth.
Pembroke.
Radnor.

The period covered for distribution is from 15th January to 30th April. In view of the increased value of the ordinary egg and the cost of maintaining stocks of high-class breeding fowls, it has been found necessary to raise the price of sittings above that of previous seasons. The eggs will be sold at 7*s.* 6*d.* per sitting, and if packed and sent by rail 1*s.* extra is required to cover the additional cost.

In view of the prospect of the revival of interest in poultry-keeping in consequence of the improvement in the feeding-stuffs situation, the value of encouraging the rearing of higher-grade poultry needs to be emphasised.

Acreage and Live Stock Returns of England and Wales in 1918.†

THE Returns of Acreage and Live Stock for England and Wales during 1918, recently published by the Board of Agriculture and Fisheries, record the result of the policy adopted by the Government early in 1917, of stimulating by legislative and administrative action the extension of the arable area and the cultivation of cereals and potatoes. The total area under the plough, and the acreage of the three main corn crops and of potatoes, according to these returns, are as follows (the figures represent thousands of acres) :—

	1914.	*1916.*	*1918.*
Arable land	10,998	11,051	12,399
Wheat	1,807	1.912	2,557
Barley	1,505	1,332	1,501
Oats	1,930	2,085	2,780
Mixed corn	—	—	142
Total corn	5,242	5,329	6,980
Potatoes	462	428	634

The figures for live stock, in thousands, are :—

	1914.	*1916.*	*1918.*
Cattle	5,878	6,216	6,200
Sheep	17,260	17,951	16,475
Pigs	2,481	2,168	1,697

* Particulars of this scheme were published in this *Journal*, October, 1916, p. 685; see also this *Journal*, December, 1918, p. 1106.

† Agricultural Statistics, 1918, Vol. LIII. Part I. Copies may be obtained [illegible] London, W.C. 2, price 2*d*. net,

It may be said from a study of the above figures that in the first two years of the War the area of arable land and of corn crops was maintained, and cattle and sheep were substantially increased, while in the latter two years the arable, corn and potato acreages were very markedly extended, cattle were maintained, but sheep and pigs were reduced below the pre-war level, pigs considerably so.

A general idea of the position in regard to both crops and stock may be obtained by comparing the average of the past five years with the four similar preceding periods, adding the figures for the single year, 1918, and confining the statement to arable land, the dairy herd and the ewe flock. The following table is abstracted in this connection :—

Period.	*Arable Land.*	*Cows and Heifers in Milk or in Calf.*	*Ewes kept for Breeding.*	*Number per 100 acres of Arable Land.*	
				Cows and Heifers.	Ewes.
	1,000 acres.	Thousands.	Thousands.		
1894-98 ..	12,467	2,084	6,994	16·7	56·1
1899-1903 ..	12,137	2,171	7,201	17·9	59·3
1904-8 ..	11,592	2,293	7,184	19·8	62·0
1909-13 ..	11,274	2,340	7,354	20·8	65·2
1914-18 ..	11,332	2,478	6,823	21·9	60·2
1918 ..	12,399	2,578	6,487	20·8	52·3

The actual increase of arable land during the War, *i.e.*, from June, 1914, to June, 1918, in England and Wales was 1,400,000 acres, or 12·7 per cent., but it was naturally greater in the grass districts than in those districts, such as the eastern counties, which were already mainly arable. In Norfolk, for instance, where over 70 per cent. of the farmed area was already under the plough, there was less scope than in Leicestershire, where about 80 per cent. was in grass.

Returns of the different crops for each of the counties of England and Wales, as well as for the whole United Kingdom, are also given.

THE following Circular Letter was addressed to Clerks of County Councils and County Borough Councils in England and Wales by the Board on 25th January :—

Destruction of Rats.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to acquaint you, for the information of your local authority, that the Board view with apprehension the evidence which reaches them from many districts of the damage and loss incurred by the depredations of rats, of the preventable damage to, or destruction of, foodstuffs, and of the further cause there is for anxiety regarding damage likely to be caused to growing crops in the spring time of the year.

2. The Rats Order, 1918,* made by the Ministry of Food under the Defence of the Realm Regulation 2J empowers your local authority to enforce the Order, and makes them responsible for its administration, under the further Order, cited as " The Local Authorities (Food Control) Order (No. 5), 1918,"† made by the Local Government Board on the

3. The Order first mentioned provides :—

(1) that the local authority may take such measures as they think proper for the destruction of rats alleged to be causing preventable damage or destruction to foodstuffs, including growing crops ; and

(2) that they may require the owner or occupier of any land or building—

(a) to take reasonable and proper precautions to prevent such land or building becoming infested by rats ;

(b) to remove from such land or building, or to destroy any accumulation of rubbish or other materials likely to attract rats ; and

(c) that the local authority may themselves take such measures as may be necessary to enforce directions given by them for the above-mentioned purposes in the event of non-compliance within seven days by the owner or occupier, who shall thereupon become liable for such expenses as the local authority may incur in securing compliance with their directions.

4. At the request of the Ministry of Food, the Board have undertaken to supervise the administration of the Order throughout England and Wales ; and, in view of the steady accumulation of evidence of the urgent need for energetic action, the President hopes that the existing Order, framed originally as a War measure, will be superseded at no distant date by such legislation as will enable the Board to enforce systematic rat destruction as a permanent measure.

5. Reports received from agricultural districts indicate that rats have multiplied enormously during the War, and that great damage and destruction is being done to foodstuffs. It is obvious that, unless active measures are taken to combat this, much of the benefit secured by the determined efforts lately made to increase production on the countryside will be lost.

6. In pre-war days the rat population of Great Britain was estimated to be 40,000,000, and the total annual food damage done by rats in rural and urban districts alone, on the assumption that each rat on an average occasioned a daily loss of one farthing ; was thus estimated to amount to £15,000,000. During the period of hostilities such methods as were customary throughout the country to keep them in check have been to a large extent suspended ; so, when it is further realised that the progeny of a pair of rats if undisturbed may amount up to 880 young rats in one year, the menace of a threatened plague of rats, and the enormity of the possible consequence of it after more than four years of war cannot easily be over estimated.

7. The Board, impressed by the urgent need for strong and immediate action in many districts, are adopting such measures under the guidance of an expert adviser as will, it is hoped, secure in the near future uniformity of action in dealing with the question. Details of the scheme will be communicated to you without delay. In the meantime, the President trusts that he may rely on the cordial co-operation of your local authority in taking such active and efficient steps under the Order as may appear, locally, in the circumstances to be required, such as the encouragement of rat clubs and advertisements calling atten-

owners and occupiers of property to use all possible means of keeping down rats, clearing infested localities in their occupation, stopping up runs and rat-holes, and rendering buildings rat-proof.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

THE following Notice was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food on 8th January:—

New War against Rats: Help for Local Authorities.

According to reports from agricultural districts, rats have multiplied enormously during the War, and great damage and destruction is being done to foodstuffs.

So serious is the position that a special department of the Board of Agriculture has just been set up, and an expert adviser, who has had considerable experience in the killing of rats on the Continent, has been appointed. Under the Rats Order issued by the Food Controller last August, local authorities were directed to take measures for the destruction of rats with a view to the preservation of crops and stocks. Some county councils pay a sum of money for each dozen of dead rats brought to them. In this way thousands of rats are being destroyed. But the local authorities, on the whole, have not done all that might be done. Inspectors of the Board of Agriculture are now going about the country urging on the local authorities the pressing necessity of dealing with the plague. Representations have been received by the Board from agricultural authorities that permanent legislation dealing with the destruction of rats is desirable, and it is hoped to introduce a Bill in the first Session of the new Parliament.

It is estimated that a pair of rats will produce on an average 880 young ones in a year. The old methods of keeping them under, practised by professional rat-catchers and game-keepers, such as trapping, ferreting, and poisoning, have almost lost their efficacy. But even these efforts were largely suspended during the War.

The rat population of Great Britain is supposed to be 40,000,000, and it is estimated that the damage done by them every year amounts to £15,000,000. This sum does not include the destruction caused in docks and warehouses.

THE following Notice was issued by the Joint Committee of the Board of Agriculture and the Ministry of Food on 8th January:—

The Warble Fly Pest.

Most farmers are aware of the prevalence of this pest, and, though few have seen the adult fly, most have, at some time or another, helped to squeeze the grub or "Bot" from its snug resting-place in the backs of the cattle. A few progressive farmers have endeavoured by systematic squeezing out, to eliminate this pest from their farms, but, although in some cases the number of "Bots" met with have been considerably reduced, their efforts have been ineffective owing to the lack of co-operation of their neighbours and the breeders from whom they buy their cattle.

[illegible]

that the damage this fly causes in the leather trade alone amounts to upwards of £300,000 a year, and this in addition to the loss resulting to the butcher from the "jellied beef" caused by the grub. This loss the farmer has ultimately to meet, as the price the trade offers is such as to cover these losses.

So serious is the damage caused to hides and beef that conferences have been held to discuss ways and means of dealing with the pest, as it is felt that organised action on the part of the farmers for several years will go far to abolishing the pest altogether. Investigation is already proceeding to find out the best way of abolishing the disease; it rests with the farmers to prove that he and his fellow workers by active co-operation can abolish the Warble Fly from its usual haunts. Farmers have always contested their right to manage their own affairs without legislative interference; we have here an instance where farmers, by suitable action fostered and encouraged by the help of the powers that be, can demonstrate their right to their attitude. For legislation, like the surgeon's knife, comes into operation when all other forces fail.

Foot-and-Mouth Disease.

THE outbreak of Foot-and-Mouth Disease at Littlethorpe, near Ripon, in the West Riding of Yorkshire, mentioned in last month's *Journal*, which was confirmed on the 9th January, spread rapidly to other farms in the immediate vicinity of the originally infected place. Twelve outbreaks were thus confirmed up to the 21st January, and information was received on the 3rd February of a further outbreak in the same locality. The restrictions which were imposed by the Board on the 9th January on the movement of animals over an area having a 15-mile radius from Littlethorpe have been modified as regards that portion of the area which is over five miles distant (approximately) from any infected place.

Rabies.

THE total number of cases of Rabies which have been confirmed to date since the present series of cases commenced in September last now stands at 117. Of these 93 were n Devonshire and 24 in Cornwall. There are also 21 cases still under investigation. The period of quarantine on approved veterinary premises, required for all dogs moved out of those counties to other parts of Great Britain, has been increased from four to six calendar months.

New Scale of Compensation for Guidance in the Enfranchisement of Copyholds of Inheritance.

THE following Scale of Compensation is framed by the Board of Agriculture and Fisheries under the powers vested in them by Section 66 of the Copyhold Act, 1894, and the Board of Agriculture and Fisheries Acts, 1889 to 1909, for Guidance in the Enfranchisement of Copyholds of Inheritance in substitution for the existing Scale of Compensation :—

1. **Fines Arbitrary.**—In fine arbitrary cases when a fine is payable on alienation by, as well

property according to the age of the tenant as set forth in the table hereto annexed.

2. The table is calculated on the principle that a fine of two years' annual value is payable on each change of tenancy ; therefore, in those manors in which the customary fine on alienation by, or on the death of, a tenant, is less than two years' annual value, a proportionate reduction should be made in the amount of the compensation.

3. In estimating the annual value of the property, no deduction should be made for land tax or landlord's property tax, but the quitrent should be deducted.

Where the net annual value of the property for poor rate assessment is used, as such value is based on the rent payable by a tenant who pays the usual tenant's rates and taxes and the tithe rentcharge, with a deduction from such rent of the probable average annual cost of repairs, insurance and other expenses, if any, necessary to maintain the property in a state to command such rent, no deductions should be made from the net annual value in respect of these matters.

Where the actual rent is used, as the tenant does not pay the tithe rentcharge this should be deducted from the rent, and such other deductions should be made as will arrive at a value based on the same principle as is adopted in the case of the poor rate assessment.

Where tithe rentcharge is deducted in assessing the compensation under the Copyhold Act, 1894, it is usual to deduct the actual value as varied by the septennial average corn prices at the time of the valuation, and not the par amount which appears in the tithe apportionment, and it is immaterial that the lord, or the tenant, is the owner of the tithe rentcharge.

4. When there are facilities for improvement or the land has present or prospective building value, four eighty-ninth parts of the fee simple value may be taken as the annual value.

5. **Fines Certain.**—In fine certain cases when a fine is payable on alienation by, as well as on the death of, a tenant, the compensation for fines may be calculated by multiplying the amount of the fine by one half of the number of years' purchase given in the table according to the age of the tenant.

6. **Reliefs.**—The amount of compensation for a relief may be calculated in like manner as a fine certain.

Heriots.—7. The compensation for a heriot payable on alienation by, as well as on the death of, a tenant, may be calculated by multiplying the value of the heriot by one half of the number of years' purchase given in the table according to the age of the tenant.

8. The value of a heriot may generally be ascertained from the average value of the last three heriots taken or paid in respect of the property to be enfranchised. If that information cannot be obtained, or will not apply, the following circumstances should be taken into consideration in fixing the value of a heriot, namely, the nature of the heriot, the character and value of the property, the condition in life of the tenant, and also whether the heriot can be seized as well without as within the manor.

9. **When Fine or Heriot Payable only on one of the Events of Alienation or Death.**—The table being calculated on the assumption that fines

payable only on one of those events, then only one half of the compensation calculated as previously directed should be given.

10. **When Fine or Heriot Payable on Death of Lord.**—In manors in which fines or heriots are payable on the death of the lord, as well as on alienation by, or on the death of, a tenant, the compensation on enfranchisement should be increased according to the nature and amount of the customary fine or heriot payable in the manor on the death of the lord.

11. **Quitrents and other Annual Payments.**—The compensation for quitrents, free rents, and other annual rents, services, or payment might, as a rule, be calculated at 22¼ years' purchase.

12. **Timber.**—Compensation for timber should be ascertained as follows:—When by a special custom of the manor the lord can enter upon the land, and cut and carry away the timber without the consent of the tenant, its whole value, after making a sufficient allowance for repairs, should be given to the lord. But where there is no special custom, so that the ordinary law of copyholds is applicable and therefore the lord cannot enter and cut without the consent of the tenant, one half only of its value, after making a sufficient allowance for repairs, should be given. If there be any other special custom in the manor relating to timber, such custom should be regarded.

13. **Forfeitures, etc.**—The compensation for forfeitures, and all other incidents of copyhold tenure not hereinbefore provided for, should not exceed 20 per cent of the annual value of the property. The annual value may be ascertained as in paragraphs 3 and 4.

14. **Escheat.**—The right of escheat being reserved to the lord under the Copyhold Act, 1894, its value is not to be taken into consideration.

15. **When Land held by Joint Tenants or Tenants in Common.**—In the case of an enfranchisement by joint tenants, the compensation for fines, and heriots if any, should be based upon such a single life as may be equivalent to the expectation of survivorship of the joint lives; and it is usual to ascertain the age of such single life according to the rules and tables appended to the Succession Duty Act, 1853. In the case of an enfranchisement by coparceners or tenants in common, the share of each tenant should be valued separately, having regard to the age of the tenant, and according to the table annexed.

16. **Special Customs or Circumstances.**—If there be any special customs of the manor, or special circumstances affecting or relating to the land to be enfranchised, or special advantages to arise from the enfranchisement, they should be taken into consideration, and due allowance should be made in respect of them.

17. **Interest.**—Interest should be made payable by the agreement or decision on the amount of the compensation at the rate of 4½ per cent. per annum from the date of the notice requiring the enfranchisement to the date of payment of the compensation, unless the compensation is paid by way of an annual rentcharge under the Act.

18. The foregoing scale is for guidance only, and is not binding as a matter of law in any particular case; but the party requiring enfranchisement should, in accordance with the Act, state to the other party whether or no he is willing to adopt the scale.

In witness whereof the Board of Agriculture and Fisheries have set [illegible] of January nineteen hundred and

TABLE REFERRED TO IN THE FOREGOING SCALE OF COMPENSATION FOR ENFRANCHISEMENT.

Age of Tenant.	Number of Years' Purchase.	Age of Tenant.	Number of Years' Purchase.	Age of Tenant.	Number of Years' Purchase.
5 or under	1·30	38	2·30	72	3·63
6	1·33	39	2·34	73	3·67
7	1·36	40	2·37	74	3·70
8	1·38	41	2·41	75	3·73
9	1·41	42	2·45	76	3·77
10	1·44	43	2·49	77	3·80
11	1·47	44	2·52	78	3·83
12	1·49	45	2·56	79	3·85
13	1·52	46	2·60	80	3·88
14	1·55	47	2·64	81	3·91
15	1·58	48	2·68	82	3·93
16	1·61	49	2·72	83	3·96
17	1·64	50	2·76	84	3·98
18	1·67	51	2·80	85	4·00
19	1·69	52	2·84	86	4·03
20	1·72	53	2·88	87	4·05
21	1·75	54	2·93	88	4·07
22	1·78	55	2·97	89	4·08
23	1·81	56	3·01	90	4·10
24	1·84	57	3·05	91	4·12
25	1·88	58	3·09	92	4·13
26	1·91	59	3·13	93	4·15
27	1·94	60	3·17	94	4·16
28	1·97	61	3·21	95	4·17
29	2·00	62	3·25	96	4·19
30	2·03	63	3·29	97	4·20
31	2·06	64	3·33	98	4·21
32	2·10	65	3·37	99	4·22
33	2·13	66	3·41	100	4·23
34	2·16	67	3·45	101	4·24
35	2·20	68	3·49	102	4·25
36	2·23	69	3·53	103 or upwards	4·26
37	2·27	70	3·56		
		71	3·60		

In constructing this Table a fine arbitrary on admission has been taken as equivalent to two years' annual value, and whilst the average fine interval has been assumed to be 14 years, regard has been had to the age of the tenant on the rolls.

THE following Notice was issued by the Joint Committee of the Ministry of Food and the Board of Agriculture on 23rd January :—

Appointment of Travelling Commission to Investigate Cost of Milk Production.

The Food Controller has appointed a Travelling Commission to make investigations in various parts of Great Britain into the costs of milk production in order to obtain the necessary data for fixing prices after 30th April. The Commission will also con-

for Milk in various areas. The following are the members of the Commission :—

C. B. Fisher, Esq., C.B.E., Agricultural Adviser to the Ministry of Food (*Chairman*).

C. S. Orwin, Esq., Director of the Agricultural Economics Research Institute, Oxford.

J. Wyllie, Esq., Lecturer on Agriculture and Book-keeping, West of Scotland Agricultural College.

J. Mackintosh, Esq., Board of Agriculture and Ministry of Food.

P. Francis, Esq., Board of Agriculture for Scotland.

M. Macfarlane, Esq., Ministry of Food.

E. W. Langford, Esq., W. Cumber, Esq., and A. Batchelor, Esq., Central Agricultural Advisory Council.

Mrs. Cottrell, G. Wilson, Esq., and W. H. Watkins, Esq., Consumers' Council.

Secretary—Miss Cowper (Ministry of Food), Room 215, New County Hall, Westminster Bridge Road, S.E. 1.

The Commission will begin its work very shortly, and will visit the areas of Divisional Food Commissioners in order to hear witnesses and consider the evidence.

THE following Circular Letter, No. S. 249/1919, was addressed to Clerks of County Councils and County Boroughs in England and Wales by the Board on 30th January :—

Redemption of Tithe Rentcharge, etc., on Land Acquired or to be Acquired for Small Holdings under the Small Holdings and Allotments Act, 1908.

SIR,—I am directed by the President of the Board of Agriculture and Fisheries to enclose copies of Forms of Application by a landowner* and Instructions* for the redemption of tithe rentcharge, corn rents, and certain other payments in lieu of tithe which have been issued by the Board in connection with the Tithe Act which received the Royal Assent on the 21st November last.

On reference to paragraphs 4 and 5 of the Instructions, it will be observed that under the new Act, the terms for redemption are more favourable to the landowner than was formerly the case, and that the amount of the consideration for redemption in any particular case, depends largely upon the deductions to be made in respect of the rates and land tax and cost of the collection on the tithe rentcharge. It will further be observed that in certain circumstances the consideration may be discharged by an annuity payable yearly or half-yearly for a period not exceeding 50 years. In this connection Sections 3, 4, and 10 of the Act and the First Schedule thereto may be referred to.

Assuming (1) local rates and land tax paid in respect of the tithe rentcharge for the three years immediately preceding the application to redeem to be, say, 5*s*. 6*d*. and 3*d*. in the pound, respectively, (2) an average assessable value for the three years of £63 for each £100 of tithe rentcharge (par value), (3) the cost of collection to be 2 per cent., (4) the rate of interest on the consideration money to be 5 per cent., and (5) that the annual amount to be set aside and invested in order to replace the consideration money at the end of 50 years is to accumulate

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under the Act to discharge the consideration for the redemption of £100 tithe rentcharge (par value) attached to a benefice would be about £104 12*s*. 5*d*. The calculation would be as follows :—

Gross Annual Value of £100 tithe rentcharge until 1st January, 1921, as fixed by the First Schedule to the Tithe Act, 1918—

	£	s.	d.	
				= £100 par value.
Deduct half rate (2*s*. 9*d*. in £) on £66 assessable value ..	= 9	1	6	
,, Land Tax (3*s*. in £) ..	= 0	16	6	
,, Cost of Collection (2 per cent. on £100) ; see First Schedule to Act ..	= 2	0	0	
				11 18 0
Net Annual Value				= £88 2 0

Consideration money = £88 2*s*. × 21 = £1,850 2*s*., *i.e*., approximately 18½ years' purchase of the par value. The amount of the annuity would be ascertained as follows :—

On reference to a 4 per cent. Sinking Fund Table it will be found that .00655 is the multiplier for ascertaining the sum which would be sufficient, if the periodical payments were accumulated at 4 per cent. compound interest, to produce £1,850 2*s*. at the end of 50 years.

	£	s.	d.
£1,850 2*s*. × .00655	= £12	2	4
Add 3 per cent. on £1,850 2*s*. ..	= £92	10	1
Therefore Annuity	= £104	12	5

The consideration money and the amount of the equivalent annuity in respect of tithe rentcharge not attached to a benefice would be calculated similarly, except that the whole rate (5*s*. 6*d*. in the £) instead of the half rate would have to be deducted in arriving at the net annual value of the tithe rentcharge. It would be found that the consideration money for the redemption would be £1,659 10*s*. 6*d*. for £100 par value, or just over 16½ years' purchase, and that the equivalent annuity would be £93 16*s*. 11*d*. It may be noted that the sum payable under the new Act in respect of every £100 tithe rentcharge which becomes due on or before the 1st January, 1926, is £109 3*s*. 11*d*. and that after that date the sum payable is to vary from year to year in accordance with the average prices of wheat, barley and oats for the fifteen preceding years.

The Board would be glad if your Council will arrange to take immediate steps for the redemption, by means of an annuity for a period of fifty years, of all tithe rentcharge and other payments in lieu of tithe to which the Tithe Act, 1918, applies, charged on land purchased by them under the Small Holdings and Allotments Act, 1908. Similarly your Council should arrange to apply for the redemption of any tithe rentcharge charged on lands purchased in the future. In this connection it should be borne in mind that under the Tithe Act, 1918, the Board's power to determine on the sole application of the landowner that the consideration for redemption shall be paid by an annuity only applies to applications made on or before the 1st January, 1921. Moreover, in some instances it will doubtless be found that land purchased for

for redemption can be lodged. In such cases, application for altered apportionment should be made forthwith. Forms for altered apportionment will be supplied by the Board on request.

I am, etc.,
(Signed) A. D. HALL.

THE following Circular Letters (No. I. 5310/18), dated 8th and 16th January, 1919, respectively, have been addressed to County Councils by the Board on the subject of agricultural education :—

The Provision of Agricultural Education after the War.

SIR,—1. The close of hostilities, the approaching end of the War, and the period of general reconstruction which must follow in agriculture as in the other foundations of the national life, make it necessary to consider in detail the arrangements for restoring and extending the county system of agricultural education, which was arising when the outbreak of war largely suspended the activities of the Board and all Local Authorities in that direction.

2. Your Authority will, of course, remember that this whole question of agricultural education was examined by the Agricultural Policy Sub-Committee of the Reconstruction Committee, who recommended that the entire cost and responsibility should be transferred from the Local Authorities to this Board. Mr. Prothero has carefully considered this recommendation, but has come to the conclusion, for reasons which need not be here discussed, that he cannot advise His Majesty's Government to accept and act on it.

3. On the Local Authorities, therefore, will continue to fall the primary responsibility for providing and working that improved system of agricultural education throughout the country which must be one of the principal sources of agricultural progress. He need scarcely say that all the assistance and advice which it is in the power of the Board to give will be freely placed at the disposal of the Local Authorities. In particular, the question of financial aid will naturally and properly occur to your Authority as one of which a settlement is required ; and he desires me to say at once that he has already put before His Majesty's Treasury proposals for increasing the annual grants paid to Local Authorities by this Department, and simplifying the regulations which govern their amount. If these proposals are accepted you will be at once informed ; and meanwhile your Authority will perhaps proceed on the assumption that this Department are aware of the necessity of placing on a simpler and more adequate basis the financial aid provided from the Exchequer.

4. He realises that at the present moment the depleted staffs of Local Authorities and the pressure of urgent work of an emergency character make it difficult for them to give the necessary time and thought to the task of drawing up for their area a considered and comprehensive scheme of agricultural education. Again, it is not possible to determine the precise effects of the provisions of the Education Act, 1918, dealing with continuation schools, nor the extent to which agricultural instruction in the counties may be temporarily deflected from its normal working by the necessity of providing it in some form or other for perhaps a large number of unskilled men desiring to settle on the land after serving in His Majesty's Forces. In spite, however, of such difficulties, Mr. Prothero feels that the time

come when preliminary steps should be taken towards creating an improved and extended system. Such a system cannot be imposed from Headquarters ; it must be built up from local foundations.

5. I am, therefore, to ask that as soon as possible your Authority would proceed to prepare a comprehensive scheme of agricultural education for your area (consulting, of course, with the Agricultural College for the Province, if any, and with neighbouring Local Authorities so far as desirable) and forward it for Mr. Prothero's consideration. The following few remarks are designed for the guidance of your Authority in drawing up such a scheme.

6. As regards form, the Board suggest that the scheme might be framed under the following heads :—

" Proposals for the development of a comprehensive system of agricultural education in the county of .... by means of :

(*a*) " The establishment and maintenance, or contributions towards the establishment and maintenance, of an institution for higher agricultural education.

(*b*) " The provision of a county staff of agricultural instructors, including particularly the appointment of an 'Agricultural Organiser.'

(*c*) " The establishment and maintenance, or contribution towards the establishment and maintenance, of a farm institute or farm school.

(*d*) " The provision of technical advice for farmers.

(*e*) " The provision of regular short courses of instruction at an approved centre or centres.

(*f*) " The provision of local courses, lectures, practical demonstrations, etc., through the agency of the County Agricultural Staff or otherwise.

(*g*) " Any other means."

7. As regards the substance of the scheme the Board at present desire to draw attention only to three matters to which they attach great and permanent importance.

8. The first is the appointment of an Agricultural Organiser of high standing and ability for every county (or group of counties) where such an officer is not already in existence. His duties and responsibilities would be, shortly, to supervise all the agricultural work done by the county or counties employing him. He might give some instruction, but his main function would be to act as an Organising Head of the county staff and the mainspring of their activities. The Board regard the appointment of a thoroughly competent man to fill this post as of such importance that they have asked His Majesty's Treasury for funds to allow them to pay to Local Authorities a specially high proportion of his salary and expenses.

9. The second is the provision by a county or groups of counties of a Farm Institute, where not already in existence—an institution which in addition to supplying courses of instruction of a type suitable to the district (and particularly winter courses for young agriculturists), also serves as a headquarters for instructors in agricultural subjects employed by the county or group of counties providing the Institute. It is contemplated that there should be attached to the Institute agricultural land on which demonstrations can be conducted of the science and practice of the industry. Effective teaching must largely de[illegible] extent to which it is possible to illustrate scientific pri[illegible]

demonstrate practice in the fields and homestead; and for this reason alone it is desirable to provide instruction at a permanent centre where a sufficient area of agricultural land is avilable for demonstration. But a farm institute performs another most useful function. As the head-quarters of the County Instructors, who co-operate in its activities, it provides them with the means of keeping in constant touch with actual farm practice, of associating themselves with farming operations, of adding to their knowledge by experiments carried out under favourable conditions, and of testing the advice which in one of their functions they are called on to furnish to farmers.

10. The strength of a farm institute staff will be dependent on the size and importance of the area served, but the following may perhaps be taken as normally representing the staff desirable for carrying on, with the fullest efficiency, the work of a farm institute.

Whole-time Officers:

Principal and Chief Instructor in agriculture.
Vice-Principal and Assistant Instructor in agriculture.
Instructor in general science.
Instructor in dairying.
Instructor in poultry-keeping.
Instructor in horticulture.
Matron and Instructress in domestic economy.

Part-time Officers:

Instructor in veterinary science
Instructor in wood work.
Instructor in iron work.

The Principal (who ordinarily will be the County Agricultural Organiser) and the Assistant Instructor in agriculture must live at the Institute, and their work should be so arranged that they are absent on county work in turn. The remainder of the full-time staff should be required to reside at or near the Institute. In order that the teaching at the Iustitute may be efficiently linked with the miscellaneous itinerant instruction it is important that every member of the whole-time staff should take part in outside work.

11. Your Authority will remember that, under the existing Regulations, grants may be made up to 75 *per cent.* of the total approved cost of providing, improving or extending a farm institute. The approved cost may include the cost of equipment (but not agricultural land attached to an institute, for which separate provision is made). The Board do not contemplate any change in the Regulations in this respect.

12. The third matter to which I am to draw special attention is the necessity of fixing for county staffs salaries adequate to attract and retain the services of thoroughly competent men and women. Mr. Prothero feels that he need not emphasise this point; but it may perhaps be added that in his opinion the general range of salaries is bound, for some time to come and perhaps permanently, to be appreciably higher than before the War.

13. Mr. Prothero hopes that even in the midst of other matters of pressing importance your Authority will be able to devote the necessary time and labour to the task of framing a really comprehensive and satisfactory scheme of agricultural education for your County; he is sure that no labour will be better repaid than that spent in devising such a scheme and bringing it into operation. He has specially deputed

condition; and in another shed where 22 sacks were stacked fowls had been feeding on the wheat, which had become mouldy, damp and caked. Defendant was fined £20 in respect of these offences, and a further £20 for keeping deposited wheat seeds without previously having had a sample taken and tested. (*National Food Journal*, 11th December, 1918.)

Barrow.—William Bowes, a farmer, was fined £25 with 5 gs. costs, on each of two summonses, for failing to deliver milk to a certain retailer as ordered by the Ministry of Food Commission for the north-western area.

Bristol.—Reginald James Hoddinott, a dairyman, was fined £30 for obstructing an inspector and wasting 2 gal. of milk. (*National Food Journal*, 25th December, 1918.)

MISCELLANEOUS NOTES.

Notes on Crop Prospects Abroad.

THE *International Crop Report and Agricultural Statistics* for January, 1919, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat.*—The production in Denmark, Spain, United Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 251,685,000 qr. in 1918, against 212,531,000 qr. in 1917, or an increase of 18·4 per cent. *Rye.*—The estimated production in Denmark, Spain, Ireland, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, and United States is placed at 21,639,000 qr. in 1918, or an increase of 41·6 per cent. compared with 1917, when it amounted to 15,279,000 qr. *Barley.*—The production in Denmark, Spain, United Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, Japan, Egypt, and Tunis is estimated to amount to 76,418,000 qr. in 1918, against 67,119,000 qr. in 1917, or an increase of 13·9 per cent. *Oats.*—It is estimated that the total yield in Denmark, Spain, United Kingdom, Italy, Luxemburg, Netherlands, Sweden, Switzerland, Canada, United States, Japan, and Tunis amounts to 261,707,000 qr. in 1918, against 253,940,000 qr. in 1917, or an increase of 3·1 per cent. *Maize.*—The production in Spain, Italy, Switzerland, Canada, United States, and Japan is estimated at 313,175,000 qr. in 1918, against 382,094,000 qr. in 1917, or a decrease of 18·0 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The areas estimated to have been sown with winter *wheat* in 1918-19, compared with the areas sown during the corresponding period of 1917-18, expressed as percentages, are as follows:—England and Wales 96, Canada 95, United States 117; with *rye*: England and Wales 95, United States 111; with *barley*: England and Wales 97; with *oats*: England and Wales 98.

France.—An official report giving crop conditions on the 1st January states that the weather has been colder with some frosts, and accordingly the position of the young crops is considered to be distinctly better,

The appearance of the new rye crop is reported to be good, although the growth of the plant is somewhat excessive for the time of the year. (*Broomhall's Corn Trade News*, 25th January, 1919.)

India.—According to the preliminary estimate, the area sown with wheat in 1918-19 is 23,472,000 acres, as compared with 33,912,000 acres, the first estimate for 1917-18, and the final estimate of 35,497,000 acres. The condition of the crop in the North-West Frontier Province is below average; in the Punjab on irrigated land average, on unirrigated, much below average; in the United Provinces on irrigated land fair to good, but elsewhere uncertain: and in Bengal poor. The area sown with rape and mustard, as reported up to date, is estimated at 2,950,000 acres as against 3,828,000 acres in 1917-18, and that sown with linseed at 2,002,000 acres as against 2,817,000 acres. (*The London Grain, Seed and Oil Reporter*, 4th and 14th February, 1919.)

South Africa.—According to an official report dated 14th December the wheat crop on 30th November was estimated at 1,070,000 qr., or 2 per cent. less than the record year of 1917, and sufficient for 8 or 9 months' normal consumption. Oats and barley are still reported to be below the normal, the former by 5 and the latter by 11 per cent., whilst the acreage is 4 to 5 per cent. less than in 1917. (*Broomhall's Corn Trade News*, 31st January, 1919.)

Agricultural Conditions in England and Wales on 1st February.

THE Crop Reporters of the Board, in reporting on the agricultural position on 1st February, state that the continual rains, followed by frost at the end of the month, hindered field work much during January. Fair progress was made on light land, and the last few days of the month gave opportunity for carting manure in some districts, but otherwise work is distinctly behindhand. Wheat appears to have suffered somewhat on very heavy or wet land, but is elsewhere satisfactory; autumn-sown oats and beans seem to be a good strong plant almost everywhere.

The condition of ewes is reported as fair to good, the wet weather having proved trying. Lambing prospects are considered fairly satisfactory on the whole. The Dorset Horn flocks have practically finished lambing: the fall of lambs is reported as moderate, but the mortality light.

Live stock are generally in fair condition. In most parts of the country, but not all, the supply of winter keep is rather short.

The steady demobilisation of agricultural labourers from the Army is relieving the scarcity of farm hands, and in several parts of the country the supply has been nearly, if not quite, sufficient for the requirements of a wet month. Skilled labour is, however, still scarce. Owing to the lateness of the season, and the deficiency of labour, proper cultivation in the autumn was frequently neglected, and it is expected that the preparation of the land for the spring crops will require more labour than usual.

THE following local summaries give further details regarding agricultural conditions in the different districts of England and Wales:—

Agricultural Labour in England and Wales during January.

Northumberland, Durham, Cumberland and Westmorland.—Owing to the return of demobilised men, the labour situation is easier in many districts, but the supply is still well below requirements. In some parts a considerable increase in the amount of work required to prepare the land for green crops is anticipated, but in one or two districts it is not expected that much extra labour will be required.

Lancashire and Cheshire.—There is on the whole a deficiency of labour, but in some cases there is enough for present needs. Farm hands are gradually returning from the Army. It is anticipated that more labour will be required shortly owing to the accumulation of work on the farms, little autumn cultivation having been done.

Yorkshire.—Skilled men are still scarce, but there is no marked deficiency of labour, and the supply in some districts is improving. It is generally anticipated that more labour than usual will be required in the spring owing to ploughing being late and a good deal of land being very foul, but much depends on the weather.

Shropshire and Stafford.—The supply of labour is improving, but still deficient, skilled men being particularly scarce. Generally it is anticipated that much more labour than usual will be required in the spring to prepare the land for green crops.

Derby, Nottingham, Leicester, and Rutland.—The supply of labour is still deficient, though in some districts the situation has improved. Generally it is anticipated that more labour than usual will be required in preparing for green crops, owing to the land being abnormally foul.

Lincoln and Norfolk.—The supply of labour shows further signs of improvement, and occasionally it is sufficient for requirements, but there is still a deficiency in most parts. In the majority of districts it is anticipated that there will be an increase in the work of preparing the land for green crops, there being much foul land.

Suffolk, Cambridge, and Huntingdon.—The supply is generally deficient, and, in some cases, very short, but the situation has not been acute owing to work being retarded by the wet weather. The preparation of the land for green crops is backward, and extra labour will be required for this work.

Bedford, Northampton, and Warwick.—Labour is generally sufficient, but there are occasional complaints as to a deficiency of skilled men. In Bedford and Warwick there is much land in a foul condition, and increased work in the preparation of the land for green crops is anticipated.

Buckingham, Oxford, and Berkshire.—The supply of labour, though sufficient in many districts, is short in others, especially as regards skilled men, but the situation generally appears to be improving. In many places, owing to the late harvest and wet autumn, the cleaning of land is very backward, and a considerable increase of work is anticipated to prepare the land for green crops in the spring.

Worcester, Hereford, and Gloucester.—The supply of labour is sufficient for present needs and men are gradually coming back from the Army. In some districts, owing to much foul land needing to be cleaned, extra labour will be required in preparing for green crops next spring, but in other districts this is not anticipated.

Cornwall, Devon, and Somerset.—The demobilisation of agricultural workers is improving the labour position, though the shortage of skilled men continues. Considerable extra work will be needed in preparation for green crops next spring.

Dorset, Wiltshire, and Hampshire.—Labour remains scarce, but the weather of the past month has reduced the demand for the time, and the release of men from the Army is making itself felt. Considerable extra labour will be needed to prepare for spring crops.

Surrey, Kent, and Sussex.—There is little change in the supply of labour, it being still short, skilled men being particularly scarce. The work of preparing the land for green crops will probably be heavier than usual.

Essex, Hertford, and Middlesex.—The position is somewhat easier in most districts, though in a few places the supply is deficient. Owing to cultivation being backward a large increase of work is expected in the spring in preparing the land for green crops.

North Wales.—Skilled men are scarce, but the situation is being eased in some cases by the gradual return of men from the Army, and the supply is about sufficient for the requirements under present weather conditions. In some districts more labour than usual will be required in the spring as cultivation is backward and a certain extent of land was left uncleaned in the autumn, but in other districts no such increase is anticipated.

Mid-Wales.—The release of men from the Army is easing the situation, but in some districts there is still a shortage of labour. In most parts an increase in the work of preparing the ground for green crops is expected, the land, in many cases, being in a foul condition, but the employment of tractors is likely to ease the labour situation.

South Wales.—Labour is still deficient in most districts. Generally extra work in preparing the land for green crops is anticipated.

AVERAGE PRICES of **British Wheat, Barley,** and ***Oats*** at certain Markets during the Month of January, 1917, 1918, and 1919.

—	Wheat.						Barley.						Oats.					
	1917.		1918.		1919.		1917.		1918.		1919.		1917.		1918.		1919.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
London ...	76	1	74	4	73	1	65	0	59	2	62	5	47	5	54	2	62	5
Norwich ...	74	1	70	10	72	6	63	11	57	3	61	10	47	3	47	8	55	9
Peterborough	74	10	70	11	72	5	64	9	58	9	62	3	47	0	44	0	51	6
Lincoln ...	76	8	71	2	72	4	66	6	58	10	62	6	48	1	52	1	51	8
Doncaster ...	75	8	70	10	72	3	65	10	58	2	61	4	47	4	42	0	46	8
Salisbury ...	75	2	70	10	72	3	64	10	58	9	62	5	46	8	47	4	49	2

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1917, 1918 and 1919.

Weeks ended (in 1919).	WHEAT.						BARLEY.						OATS.					
	1917.		1918.		1919.		1917.		1918.		1919.		1917.		1918.		1919.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 4...	76	0	71	2	72	2	66	4	58	0	62	3	47	1	45	5	48	8
,, 11...	75	8	71	2	72	6	65	7	58	2	62	5	47	2	46	9	49	8
,, 18...	75	8	71	3	72	7	64	9	58	1	62	3	47	4	47	9	50	0
,, 25...	75	10	71	1	72	7	64	5	58	7	61	10	47	8	48	2	49	6
Feb. 1...	75	10	71	2	72	8	64	0	58	10	62	4	47	3	50	2	49	7
,, 8...	76	0	72	0	72	7	63	5	59	0	62	3	46	11	50	6	49	2
,, 15...	76	3	72	3	72	8	63	8	58	11	62	5	47	3	52	0	49	0
,, 22...	76	9	72	2			63	9	58	9			47	8	52	3		
Mar. 1...	77	4	72	2			64	0	57	9			48	0	52	0		
,, 8...	78	0	72	3			63	7	58	5			48	7	52	2		
,, 15...	78	10	72	4			64	1	56	10			49	4	51	0		
,, 22...	80	3	72	3			65	6	56	9			50	4	50	3		
,, 29...	81	5	72	4			71	10	56	7			51	10	48	10		
Apl. 5...	84	4	72	11			69	11	56	7			55	1	49	10		
,, 12...	85	2	73	3			71	10	56	6			57	2	47	2		
,, 19...	84	10	73	3			70	6	56	6			59	8	47	0		
,, 26...	81	1	73	3			69	5	56	10			58	6	46	8		
May 3...	77	7	73	5			64	4	56	5			54	9	47	4		
,, 10...	78	0	73	5			64	11	56	6			55	2	47	6		
,, 17...	77	11	73	4			64	10	56	6			55	2	46	4		
,, 24...	78	0	73	3			64	9	56	6			54	11	47	8		
,, 31...	78	0	73	8			65	11	60	0			54	11	44	9		
June 7...	78	0	73	11			67	7	59	2			55	0	45	5		
,, 14...	78	2	74	3			75	6	57	9			55	1	45	7		
,, 21...	78	1	74	4			75	0	58	5			55	2	47	8		
,, 28...	78	3	74	4			73	11	57	10			55	1	46	4		
July 5...	78	1	74	4			69	5	61	7			55	2	46	10		
,, 12...	78	2	74	4			70	10	57	5			55	1	47	0		
,, 19...	78	3	74	3			72	1	60	5			55	2	45	4		
,, 26...	78	3	74	3			65	7	56	11			55	2	46	2		
Aug. 2...	78	2	74	3			73	6	57	1			55	0	45	10		
,, 9...	78	4	74	7			76	1	57	7			55	0	46	3		
,, 16...	78	7	74	2			68	11	61	4			55	6	55	11		
,, 23...	76	7	74	8			70	7	62	6			54	7	56	9		
,, 30...	72	1	74	8			60	4	60	1			49	0	57	11		
Sept. 6...	71	6	72	3			59	3	60	4			46	7	56	9		
,, 13...	70	7	72	5			57	2	60	1			45	0	49	2		
,, 20...	70	8	72	6			56	10	60	4			45	8	49	11		
,, 27...	70	6	72	7			58	5	60	3			44	7	50	3		
Oct. 4...	70	8	72	8			57	9	60	3			44	9	50	9		
,, 11...	71	0	72	6			58	5	60	3			44	5	51	6		
,, 18...	70	8	72	7			59	3	60	3			44	1	50	9		
,, 25...	70	10	72	5			60	1	60	3			43	0	50	5		
Nov. 1...	70	4	72	4			59	11	60	3			42	4	50	8		
,, 8...	70	3	72	4			60	2	60	3			42	11	49	11		
,, 15...	70	3	72	5			60	2	60	3			43	0	49	10		
,, 22...	70	2	72	4			59	9	60	10			43	1	51	1		
,, 29...	70	2	72	3			59	3	62	2			44	6	50	4		
Dec. 6...	70	7	72	4			58	7	62	6			43	5	51	4		
,, 13...	71	2	72	3			58	0	62	7			43	6	51	4		
,, 20...	71	1	72	4			57	7	62	3			44	2	50	5		
,, 27...	71	1	72	3			57	7	62	3			44	10	50	6		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in January, 1919, and December, 1918.

(*Compiled from Reports received from the Board's Market Reporters.*)

Description.	January.		December.	
	First Grade.	Second Grade.	First Grade.	Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	78 0	73 0	77 1	72 6
Herefords	77 7	72 5	76 2	71 7
Shorthorns	77 6	72 6	76 8	71 7
Devons	77 10	72 10	77 0	71 8
Welsh Runts	—	—	76 2	71 7
Fat Cows	72 8	64 8	71 9	63 8
	First Quality. per lb.*	Second Quality. per lb.*	First Quality. per lb.*	Second Quality per lb.*
	d.	d.	d.	d.
Veal Calves	12¼	10¾	12¼	11
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh...	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score. live weight.	per score. live weight.	per score. live weight.	per score. live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	54 12	41 10	58 5	45 4
,, —Calvers ...	47 6	37 10	50 11	40 12
Other Breeds—In Milk ...	45 3	36 4	51 17	42 18
,, —Calvers ...	30 0	29 0	33 0	31 12
Calves for Rearing	3 9	2 11	3 9	2 12
Store Cattle :—				
Shorthorns—Yearlings ...	16 5	13 6	16 18	13 15
,, —Two-year-olds...	25 15	21 17	26 16	22 17
,, —Three-year-olds	33 10	29 10	33 17	30 8
Herefords—Two-year-olds...	27 0	24 0	27 3	24 19
Devons— ,,	26 8	22 0	26 12	23 3
Welsh Runts— ,,	25 0	23 0	25 17	22 4
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	67 3	54 6	61 4	49 0
Store Pigs :—				
8 to 12 weeks old	36 5	24 11	29 4	19 5
12 to 16 ,, ,, ...	70 0	52 9	60 7	44 10

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins, which during January made prices equivalent to an additional 1⅝d. per lb. of the carcass weight for Downs, Longwools, Cheviots, and Cross-breds, and 1¼d. for Blackfaced and Welsh, and during December, 1¼d. per lb. for Downs and Cross-breds, 1⅝d. for Longwools, and 1¼d. for Cheviots, Blackfaced and Welsh.

In addition to the price quoted above for sheep per lb., sellers were entitled, under the Live [illegible] to charge an extra amount ranging from 1s. 6d. to 5s. per

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in January, 1919.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	BRISTOL.		LIVERPOOL.		LONDON.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
BUTTER :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	27 6	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
CHEESE :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
BACON :—						
Irish (Green) ...	189 6	—	189 6	—	189 6	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
HAMS :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
EGGS :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	50 0	—
Irish	—	—	—	—	50 0	—
American (Cold Stored)	40 0	—	40 0	—	40 0	—
POTATOES :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	165 0	150 0	186 6	—	188 0	150 0
Edward VII.	205 0	170 0	200 0	180 0	191 0	165 0
Up-to-Date	200 0	170 0	155 0	148 6	190 0	—
HAY :—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

AVERAGE PRICES of DEAD MEAT at certain MARKETS in ENGLAND in January, 1919.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	133 0	133 0	—	133 0	133 0
	2nd	133 0	133 0	—	133 0	133 0
Cow and Bull	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	112 0	116 6	116 0
Irish: Port Killed ...	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	133 0	133 0	133 0
Argentine Frozen—						
Hind Quarters ...	1st	148 0	148 0	148 0	148 0	148 0
Fore ,, ...	1st	118 0	118 0	118 0	118 0	118 0
American Frozen—						
Hind Quarters ...	1st	147 0	146 0	147 0	147 0	147 0
Fore ,, ...	1st	116 6	115 6	116 6	116 6	117 0
Canadian Frozen—						
Hind Quarters ...	1st	144 6	143 6	—	144 6	—
Fore ,, ...	1st	114 6	113 0	—	114 6	—
VEAL:—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	112 0	93 6	97 0	93 6	98 0
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
English	1st	140 0	140 0	—	140 0	140 0
	2nd	140 0	140 0	—	140 0	140 0
Irish: Port Killed ...	1st	—	—	140 0	—	140 0
	2nd	—	—	140 0	—	140 0
Argentine Frozen ...	1st	140 0	140 0	140 0	140 0	140 0
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	140 0	—	140 0	—
Australian...	1st	—	140 0	—	—	—
Argentine	1st	140 0	140 0	140 0	140 0	140 0
PORK:—						
British	1st	—	153 0	149 6	152 6	149 6
	2nd	—	149 6	—	—	—
Frozen	1st	—	—	—	151 0	—

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

Disease.	January. 1919.	January. 1918.
Anthrax:—		
Outbreaks	17	30
Animals attacked	17	34
Foot-and-Mouth Disease:—		
Outbreaks	12	—
Animals attacked	70	—
Glanders (including Farcy):—		
Outbreaks	—	2
Animals attacked	—	3
Parasitic Mange:—		
Outbreaks	719	611
Animals attacked	1,588	1,247
Rabies:—		
Number of cases	16	—
,, ,, Dogs affected ...	14	—
,, ,, other animals affected	2	—
Sheep-scab:—		
Outbreaks	81	94
Swine Fever:—		
Outbreaks	72	71
Swine slaughtered as diseased or exposed to infection	30	24

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

Disease.	January. 1919.	January. 1918.
Anthrax:—		
Outbreaks	—	—
Animals attacked	—	—
Glanders (including Farcy):—		
Outbreaks	—	—
Animals attacked	—	—
Parasitic Mange:—		
Outbreaks	9	14
Sheep-scab:—		
Outbreaks	57	50
Swine Fever:—		
Outbreaks	5	1
Swine slaughtered as diseased	13	1

The Weather in England during January.

District.	Temperature. Daily Mean.	Temperature. Diff. from Average.	Rainfall. Amount.		Rainfall. Diff. from Average.	Rainfall. No. of Days with Rain.	Bright Sunshine. Daily Mean.	Bright Sunshine. Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 4th Jan.:								
England, N.E. ...	39·4	+1·4	1·67	43	+30	7	0·9	−0·1
England, E.	41·4	+3·6	1·00	25	+12	6	1·5	+0·1
Midland Counties ...	40·7	+2·8	1·46	37	+22	6	1·3	+0·1
England, S.E. ...	48·0	+3·4	1·40	36	+22	6	0·9	−0·5
England, N.W. ...	40·9	+1·4	1·24	31	+12	7	1·1	+0·1
England, S.W. ...	42·7	+1·2	1·70	43	+20	6	1·4	−0·1
English Channel ...	46·6	+1·8	1·66	42	+22	6	0·9	−1·0
Week ending 11th Jan.:								
England, N.E. ...	38·9	+1·0	0·39	10	0	5	1·2	+0·1
England, E.	40·0	+2·7	0·64	16	+ 6	5	1·2	−0·4
Midland Counties ...	38·5	+1·4	0·41	10	− 1	5	1·6	+0·3
England, S.E. ...	41·6	+2.7	1·37	35	+23	7	1·2	−0·4
England, N.W. ...	39·1	0·0	0·91	23	+ 8	6	1·2	−0·1
England, S.W. ...	40·9	+0·3	1·40	36	+17	7	1·9	+0·3
English Channel ...	44·5	+0·5	1·25	32	+14	6	2·3	+0·4
Week ending 18th Jan.:								
England, N.E. ...	38·2	−0·1	0·73	19	+11	4	2·3	+0·9
England, E.	40·5	+2·7	0·68	17	+ 8	5	1·6	+0·1
Midland Counties ...	40·1	+2·1	0·87	22	+12	5	1·8	+0·4
England, S.E. ...	42·3	+2·8	0·77	19	+ 7	5	2·2	+0·6
England, N.W. ...	40·5	+0·9	0·96	24	+ 8	6	2·3	+1·0
England, S.W. ...	43·4	+2·3	1·33	34	+16	6	2·4	+0·8
English Channel ...	46·8	+2·5	1·51	38	+24	7	2·6	+0·6
Week ending 25th Jan.:								
England, N.E. ...	34·9	− 3·6	0·69	18	+ 9	5	0·3	−1·3
England, E.	34·9	−3·4	0·42	11	+ 2	4	0·3	−1·8
Midland Counties ...	34·6	−3·9	0·69	18	+ 6	4	0·8	−0·8
England, S.E. ...	36·0	−3·6	0·56	14	+ 2	4	1·2	−0·7
England, N.W. ...	38·5	−1·2	0·53	13	− 5	5	0·5	−1·1
England, S.W. ...	38·9	−2·3	1·03	26	+ 5	4	1·5	−0·3
English Channel ...	42·5	−1·8	1·42	36	+20	4	1·4	−0·8
Week ending 1st Feb.:								
England, N.E. ...	35·3	−3·6	0·48	12	+ 1	6	1·2	−0·9
England, E.	32·6	−6·3	0·42	11	0	6	0·3	−2·1
Midland Counties ...	33·1	−5·9	0·34	9	− 4	5	0·6	−1·3
England, S.E. ...	33·3	−7·0	0·54	14	+ 1	5	0·3	−2·0
England, N.W. ...	35·5	−4·5	0·29	7	−11	3	1·6	−0·1
England, S.W. ...	34·9	−6·4	0·35	9	−12	4	2·6	+0·4
English Channel ...	39·4	−4·8	0·56	14	− 3	5	2·2	−0·4

* 1 inch = 25·4 millimetres.

ADDITIONS TO THE LIBRARY.

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Irish Agricultural Organisation Society.—Publication No. 19 (New Series): The Butter Control Scheme. (33 pp.) Dublin, 1917. 6*d*. [63.728.]

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Buckley, W., and *Mackintosh, J.*—The Tuberculin Test. (15 pp.) London: National Clean Milk Society, 1918. 6*d*. [614.5.]

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Fontes, Dr. A. C.—Tuberculose Bovina: Relatorio apresentado a Commissao Executiva do Congresso de Pecuaria. (32 pp.) Rio de Janeiro, 1918. [614.5.]

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Hooley, W.—Poultry-keeping in War-time. (31 pp.) London: "Country Life" Offices, 1918. 9*d*. net. [63.651(04).]

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Forestry—

Whellens, W. H.—Forestry Work. (236 pp.) London: T. Fisher Unwin, 1918. 8*s*. 6*d*. net. [63.49(022).]

Webster, A. D.—Seaside Planting: For Shelter, Ornament, and Profit. (156 pp.) London: T. Fisher Unwin, 1918. 18*s*. net. [63.498; 63.12.]

Engineering—

Houston, A. C.—Rural Water Supplies and their Purification. (136 pp.) London: J. Bale, Sons, and Danielsson, 1918. 7*s*. 6*d*. [628.7.]

Shearer, H. A.—Farm Mechanics: Machinery and its Use to Save Hand Labour on the Farm. (250 pp.) Chicago: F. J. Drake & Company, 1918. [63.17(02).]

Concrete Utilities Bureau.—No. 4.—Concrete Paths and Pavements, Kerbs, and Gutters. (16 pp.) London, n.d. [69(04).]

Concrete Utilities Bureau.—No. 5.—Concrete Fences, Gate-posts, and Walls. (23 pp.) London, n.d. [69(04); 692.]

Concrete Utilities Bureau.—No. 6.—Concrete Floors, Feeding Floors, and Footpaths. (16 pp.) London, n.d. [69(04); 63.6:69.]

Economics—

Faber, H.—Co-operation in Danish Agriculture. (176 pp.) London: Longmans, Green, and Company, 1918. 8*s*. 6*d*. net. [334(489).]

Ashby, A. W.—The Rural Problem. (40 pp.) London: The Athenæum Literature Department, 1916. 6*d*. [338.1.]

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THE JOURNAL

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EDITORIAL NOTES.

Agricultural Education.

In the last issue of this *Journal* there appeared (p. 1389) two Circular Letters addressed to the Local Education Authorities on the subject of schemes for promoting Agricultural Education in rural areas. Now that hostilities have ceased it is most important that attention should be given to the reconstruction of agricultural education, particularly in view of the interest in home food production which the War has awakened. It is, therefore, very gratifying to be able to announce that Treasury sanction has been obtained for the provision of grants on a much more liberal scale than heretofore. Briefly, it may be said that to every pound provided by a Local Authority the State will now add at least two pounds. This goes far towards meeting the demands put forward by the Agricultural Policy Sub-Committee, while at the same time preserving the present organisation of local government in educational matters which that Committee proposed to weaken.

There is now no reason why every county should not have an Agricultural Organiser—a type of officer whose worth has been abundantly proved during the War. It may also be hoped that a great increase in the number of Farm Schools or Institutes will now take place.

* * * * * *

Weeds.

Strictly speaking, weeds should be attacked all the year round, at any time and in every place where they are troublesome or are likely to prove a source of infestation to arable or grass land. Yet there are periods when weeds are more vulnerable than at others, and one of these periods is the early spring time, when dormant embryos burst through the seed cases and seedlings push their way through the soil to seek the invigorating influence of sunlight and to absorb carbon from the air in the process of photosynthesis—or " growth." At the same time biennial and perennial roots renew their life, and strong stems (as in the case of thistles and docks) or slender growths (as

in the case of couch-grass and bindweed) commence to make their presence evident.

At this time particularly spring-germinating seeds may be successfully destroyed in their thousands and millions by means of repeated superficial stirring or scratching of the soil, both at the time of seed-sowing and after the cultivated crop is well above ground. Preliminary surface cultivations are thus followed by others, and these in turn by horse-hoeing, hand-hoeing, and even on occasion by hand pulling where for some special reason a crop has got out of hand, or to remove weeds *which have escaped—as some invariably will escape—the methods previously followed.*

A further method of destroying seedling weeds consists in spraying with a solution of some substance poisonous to the weeds, but harmless—or comparatively so—to the cultivated crop. This method has been practised for many years in the case of charlock (see the Board's Leaflet No. 63), but certain other weeds also appear to be more or less crippled and seeding largely prevented by the same means, *e.g.*, poppy, corn cockle, black bindweed, dock, groundsel, dandelion, perennial sow thistle, cornflower, thistle and coltsfoot; while spurrey and persicaria or redshank may be destroyed (see Leaflet No. 112, *Weeds and their Suppression*).

Weeds may do immense damage where they occur in superabundance, even reducing the cultivated crop by one-half, or more, while they may distribute seed in thousands from an individual plant, and reduce the value of a crop intended for seed owing to the presence in quantity of their seeds. The quantity of weed seeds present in the soil is remarkable: the writer once removed by hand no fewer than 1,050 weed seedlings *as a first weeding* from 1 sq. yd. (= over five millions from an acre) of good garden soil which had been well cultivated for at least three years. Others have found by several weedings far greater numbers than this. Immense losses are due to weeds, and it has been estimated that about 16½ million pounds sterling per annum are lost by farmers in Great Britain in growing (and getting rid of) weeds. It is, therefore, essential that farmers should make a careful study of the means by which weeds may be kept within reasonable limits, and at the moment thay should make every endeavour and use all available labour to combat weeds and ensure that the loss of crops due to *this cause is reduced to a minimum.*

At p. 1474 of this issue of the *Journal* appears an article by Dr. Winifred Brenchley dealing with the eradication of weeds [illegible]

also dealt with in the Board's Leaflets No. 63 (*The Destruction of Charlock*), No. 166 (*Some Common Thistles*), No. 180 (*Dodder*), No. 194 (*Coltsfoot*), No. 222 (*Meadow Saffron*). No. 226 (*Broom-rape*), No. 249 (*Couch or Twitch*), No. 251 (*Some Common Weeds*), No. 297 (*Seed Testing*), and No. 326 (*Injurious Weed Seeds in Grasses and Clovers Harvested for Seed in Britain*).

* * * * * *

The Warble Fly Pest.

MOST farmers, butchers, dealers in hides, and tanners are familiar with the damage done to cattle by the Ox Warble Fly, the larvæ of which perforate the hide of the animal, cause loss of milk or of meat, and do serious damage to the hides owing to the perforations. This fly is a pest throughout Europe, and in our own Islands a moderate estimate puts the annual loss in damaged hides alone at upwards of £300,000. To this must be added loss of milk and condition in the animals attacked, due to irritation and direct loss in the form of "jellied beef." The total losses, therefore, must be very heavy.

Last July, the War Office, impressed by the damage caused to hides by this fly, called a Conference of Government Departments, men of science, traders and others familiar with the pest, to discuss the measures necessary to rid the country of the Warble Fly. The Conference formed a Committee to consider and recommend possible ways and means of exterminating the pest.

A Scientific Sub-Committee, presided over by Sir Stewart Stockman, Chief Veterinary Officer to the Board of Agriculture, has been appointed to supervise and control experiments which are to be carried out in different parts of the country in order to discover, if possible, a means of abolishing the pest. A Government grant has been sanctioned for the purpose, and the experiments are designed to furnish information on methods of preventing the fly from depositing its eggs on cattle, and as to the effects of drugs in destroying the larvæ in the body of the host before they can produce harmful effects on the hide. It is realised that without active co-operation on the part of the farmer any methods which may be recommended by the Scientific Committee for abolishing the pest cannot achieve their object. Steps are accordingly being taken to bring home to farmers throughout the kingdom the damage done by the Warble Fly and to familiarise them with the appearance, life-history and habits of the insect. Correspondence on this subject should be addressed to the Secretary, War Materials Section, Imperial House, Tothill Street, Westminster, London, S.W. 1.

THE REMOVAL OF HEDGEROWS.

A WORK FOR DEMOBILISED SOLDIERS.

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IN the Report of the Agricultural Policy Sub-Committee,* Sir Sydney Olivier, K.C.M.G., and Sir Thomas Middleton, K.B.E., made the following statement :—

> "For the purpose of increasing the national food supply, land already in hand has the great advantage over 'waste' land, in that it is largely already capitalised, and more important still is already equipped and provided with a trained directing staff; the whole of such a staff would have to be provided for added land. An increase of 1 acre in 20 in every farm in England and Wales—requiring in each case a trifling effort of the farmer—would add 550,000 acres to the total under the plough."

The following article purports to show how such an increment of land could be obtained by the removal of hedgerows where they are already too numerous, by which means a great increase of cultivable land could be secured. At the same time the productive capacity of the adjacent lands would be materially improved, and all future cultural operations greatly reduced in cost.

It seems to be very tardily recognised that fields which were suitable as regards their size for the agriculture of a couple of centuries ago—when the sickle was used to reap the corn and the pack-horse to carry it away—are distinctly unsuitable and uneconomic at the present time.

With the appearance of the drill, the manure distributor, the self-binding harvester, and, more recently, the motor tractor, there has seldom been any corresponding increase in the size of the fields ; so that it is quite common to find arable fields of two acres or less (especially in the West of England) being cultivated by implements very similar to those which it is customary to use on the open prairie lands of America. The merest tyro will see that such tillage must be very expensive by being so "cribbed, cabined and confined." Fields, therefore, should be enlarged, and excessively wide hedgerows reduced to reasonable limits, so that the utmost can be obtained

* Report of the Agricultural Policy Sub-Committee of the Reconstruction Committee, 1918. (Cd. 9079, 1918.) Published by His Majesty's Stationery Office.

from a given area of land, and adequate scope afforded to the newer type of cultivation referred to.

The details given below show how widespread is the evil of small enclosures and how great the loss in acreage which the present fences entail.

The Existence of Small Enclosures and Numerous Hedgerows.—From the literature consulted, reference may be made to the following:—

1796. Marshall* describes the fences of Devonshire thus: "Nothing marks the rural management of this extremity of the island more strongly than the construction of its farm fences. The bank or foundation of a Devonshire hedge is a mound of earth, eight, ten or more feet wide at the base and sometimes nearly as much in height; narrowing to 6, 7 or more feet wide at the top which is covered with coppice woods, as oak ash, sallow, birch, hazel. These are cut as coppice wood at 15 or 20 years' growth, and at more perhaps than 20 ft. high, besides the height of the mound, together forming a barrier perhaps 30 ft. in height. . . . It appears to me most probable that these coppice fences were adopted to supply fuel . . . Many farms have no other woodland, nor supply of fuel than what their fences furnish. . . . Hedgewood is looked up to as a crop, and is profitable as such, besides the benefit received from the mounds and stubs as fences. The age of most of these fences is great beyond memory, . . . and whether, upon the whole (the fence) under consideration is preferable to the ordinary live hedge of the kingdom, I will not attempt to decide . . . to an invading army they would be most embarrassing: an extent of country intersected by such barriers would be in effect one immense fortification."

Marshall speaks elsewhere† of the fences found in Devonshire as the "Danmonian fence."

1844. Grant,‡ when writing on the Hedges and Enclosures of Devon, commences with this pertinent remark:—"Every practical farmer coming into Devon for the first time is struck with the fertility of the soil and the genial climate, . . . but he is astonished at the small quantity of produce of the soil returned per acre. . . .

"No great improvement in farming," he continues, "is possible while hedges are so many and so large, so that upwards of 7 per cent. of the land is occupied by them. For nearly a ridge wide on either side of this bank the corn is hardly worth reaping."

Grant made a survey of a district within a circuit of 15 miles of Exeter, embracing the parishes of Huxham, St. George's Clyst, Rewe, Poltimore, Clisthydon, Feniton, Talaton, Silverton, Broadclyst, and Crediton, which vary in area from about 700 to 9,000 acres each, forming a total of nearly 37,000 acres. "No enclosure is considered

* Rural Economy of the West of England, Marshall, 1796, p. 65, 66 and 69.

† *Ibid.*, p. 288.

‡ *Journal of the Royal Agric. Soc. England.*, Vol. V, 1844, pp. 420 *et seq.*

unless it be in arable, pasture, or orchard, all coppice woods and plantations being omitted." The tithe apportionments constitute the surveyor's authority.

The result of Grant's survey of 36,976 acres shows that this acreage was divided up into 7,997 fields. Further details are given in the Table below:—

Number of Fields.		Size Varying between	Total Acres.	Approximate Percentage of Land Occupied by Fields of Various Sizes.	
805		½ and 1 acre	704	1·9	
1,347		1 ,, 2 acres	2,357	6·4	
1,293	5,680	2 ,, 3 ,,	3,771	10·0	46·3
1,220		3 ,, 4	4,981	13·5	
1,015		4 ,, 5 ,,	5,328	14·5	
743		5 ,, 6 ,,	4,767	13·0	
511		6 ,, 7 ,,	3,875	10·5	
357		7 ,, 8 ,,	3,258	8·5	
231	2,317	8 ,, 9 ,,	2,290	6·2	53·0
148		9 ,, 10 ,,	1,640	4·5	
327		Over 10 acres each.	4,005	10·0	
Total 7,997			36,976		

It will be seen that approximately 5,680 fields or 46 per cent. of the total acreage was divided up into fields of 5 acres or less, leaving 2,317 fields, or 54 per cent. in fields of more than 5 acres in extent.

Grant goes on to say that "in the parish of Broadclyst the hedges would make a bank of earth between the capitals of England and Scotland. In the parish of Crediton the hedges would more than extend from Land's End through the centre of England to Edinburgh in Scotland."

In these 37,000 acres he calculates "there are 1,650 miles of hedge" (that is one mile of fence to every 22 acres) "about half as long again as the famous wall of China, and sufficient to hedge round the whole of England with an immense bank of earth and occupying 2,640 acres." He also states that, as the result of his investigation, "805, or 10 per cent. in every 100 enclosures, are between half and two acres."

Grant returns to the subject again in the following issue* and gives a further example in Devon of an estate of 258 acres divided up into 97 enclosures (averaging 2·66 acres each). He estimates that there are 28 acres of hedges and waste of which 20 acres of the former might be saved.

1845. Grigor, "On Fences," says†: "In a country like Britain so celebrated for its advanced position in Agriculture, it appears almost anomalous that it should have so long retained such an evil as its overgrown and cumbrous hedges," and "No part of our rural economy is so susceptible of improvement as the fences of England."

1850. Sir Thomas Acland, writing on "The Farming of Somerset,"‡ refers to the loss in that county resulting from its superabundance and excessive width of hedgerows.

1860. Mechi, on "A trip to North Devon,"§ wrote:—"The most striking agricultural deformity is the miserably small dimensions of the

* *Journal, R.A.S.E.*, 1845, p. 246. † *Journal, R.A.S.E.*, 1845, p.194.
‡ *Journal, R.A.S.E.*, 1850, p. 748.
§ "*How to Farm Profitably*," Mechi, 1860, p. 77

fields. From $\frac{3}{4}$ to $2\frac{1}{2}$ acres is a common size. No doubt, in a primitive pastoral county without other shelter for stock, such enclosures were once found needful, but they must now give way to the introduction of a different system." He then goes on to describe the then Lord Fortescue's improvements, stating how this landowner converted 72 fields whose total area was 126 acres (an average of 1.75 acres each) into 12 enclosures of about 10 acres each.

1885. Darby, on the "Agriculture of Glamorganshire,"* writes :—"At St. Fagans, journeying from Ely, the tourist first becomes acquainted with these wretchedly small fields with straggling fences that form such a prominent feature of the entire stretch of country between the feet of the Welsh mountains and the Lias Vale."

He goes on to say that the evil is far worse in the Llantrissant and Pencoed districts, and quotes a paragraph written in 1872 on the Report of the Farm Prize Competition, which reads :—"In Wales, miles of huge banks from 6 to 10 ft. wide and topped it may be with a few briars and scattered quicks—intended as a division between small and irregularly-shaped fields, but rather providing for snug nurseries of all manner of filth—might well be dispensed with . . the fences are crooked, broken down and three times too wide."

1890. In the Report of the Prize Farms (Devon),† in which Newtake Farm, Staverton (the 3rd Prize Farm) is described as consisting of 90 fields totalling 366 acres or 4 acres per field, it is stated that there are 10 miles of fences bounding these fields without counting $9\frac{1}{2}$ miles of boundary and road fences, and in the Report on "Farming in Devon and Cornwall,"‡ appearing in the same issue, the statement runs :—"Devon is well known as the land of small enclosures . . . many instances were noticeable of adjoining fields of two to three acres apiece, on the same farm, being under the same crop, where the division fences could be spared without the slightest interference with the cropping, or to the prejudice of the grazing of the seeds."

In 1914, Sir A. D. Hall used these words in connection with his description of Devonshire farming § :—"Trees are also very much in evidence, for the small fields are divided by huge banks faced with stones, which generally carry on the top a line of hedgerow timber 20 or 30 ft high."

Parish.	*No. of Fields.*	*Total acres Surveyed.*	*Average acreage of each Field.*
Shaldon, etc.	355	1,168	3·29
Kingsteignton	572	1,979	3·45
Bishopsteignton	476	2,594	5·45
Dawlish	606	3,059	5·04
Highweek	368	1,857	5·04
Ideford	44	191	4·35
Ogwell	212	806	3·80
Total ..	2,633	11,654	4·42
Grant's figures‖ were :	7,997	36,976	4·62

* *Journal of the Bath and West of England Agric. Soc.*, 1885, p. 147.
† *Journal, R.A.S.E.*, 1890. Report on the Prize Farms, p. 796.
‡ *Journal, R.A.S.E.*, 1890, "Farming in Devon and Cornwall." F. Punchard, p. 531.
§ "A Pilgrimage of British Farming" A. D. Hall. 1913.
‖ See footnote (‡) p. 1409.

1918. During last year the writer made a survey of the following parishes: Shaldon, Stoke-in-Teignhead, Haccombe, Kingsteignton, *Bishopsteignton, Dawlish, Highweek, Ideford,* and Ogwell, all in the neighbourhood of Newton Abbot, South Devon. The results are shown in tabular form on the previous page.

Summarising the two sets of figures (which are remarkably similar in detail), the results show that in a survey of 48,630 acres there are actually 10,630 enclosures, or the fields average approximately 4½ acres each.

The Origin of Small Enclosures.—It is necessary to realise that in very early times the countryside showed no division into fields as they are known to-day. The land which had been reclaimed from the waste or forest was open and unenclosed, except that lying immediately around the village, where in time each occupier enclosed a small patch of land in which to retain his cattle at night and in very severe weather.

Two or three hundred years ago there appear to have been two main types of primitive agriculture prevalent in England and Wales.

First the open-field system, which obtained principally in the Midland and Eastern counties. Corn growing seems to have been the chief characteristic of this type. The land was generally held under the lord of the manor, the rent being paid in the form of money, kind and service.

The arable land of the village or township was generally in two and sometimes three huge fields. Each occupier, instead of having the whole of his holding in a compact block in one of these large fields, held it scattered about in acre or half-acre strips, so that a man farming, say 30 acres (which at one time appeared to be the normal holding) would occupy from 10 to 20 of these parcels in each of the township's two or three large fields. When there were three of these fields, one-third of the land was sown with wheat, one-third with spring corn, and the remainder was fallow, and after harvest each owner's cattle were allowed to graze in common over the stubble of all the occupiers.

Towards the end of the Eighteenth Century and early in the Nineteenth Century, various Acts of Inclosure were passed by Parliament, with the result that these lands were thrown together into compact holdings, although prior to this consolidation of the holdings and enclosure by mutual agreement had to some extent been carried out. White-thorn fences were planted by the tenant to form fields as we now know them.

The *second* type, which was prevalent in Wales, the Celtic fringe generally, and also in Devon and Cornwall, appears to have had none, or very little, of the open field in its constitution, and the land, instead of being held under the lord of the manor, was owned by the chief of the tribe, the tribes forming hamlets or smaller communities than those of the village type. Here the land appears to have been chiefly used for stock raising and the production of wool. Although at first there was community of grazing rights, as in the type first mentioned, it early became recognised that fences were necessary to keep the stock within bounds, and also that when land was enclosed there was greater incentive for the occupier to clean, improve and manure it by depasturing his stock upon it. Apparently much land in these districts during the Sixteenth and Seventeenth Centuries became enclosed. Perhaps, also, the chief of the tribe allowed his tenants to enclose direct from the waste or forest, when the latter desired to extend their holdings. Now this type of enclosing, direct from the waste at will, and without any preconceived plan as to where cart tracks or roads would subsequently be required, naturally would not be so systematic even as the enclosures which took place by Act of Parliament two or three centuries later in the open-field system of the Midlands.

It was the day of small things altogether. The occupier was mostly concerned in providing sufficient food for himself and his dependents and not farming with the idea of amassing wealth

Gonner* terms such enclosures "ancient enclosures" and he says that ancient enclosures are small and irregular, and a few curved. He also states that there are certain tests though not necessarily invariable tests of early enclosure—

1. Irregular and small fields.;
2. Hedges often more thickly filled with trees;
3. High banks are regarded by some as an indication of this;

and later that there was much enclosure from the wild state, especially in the West.

The above thus explains why the fields are so much smaller in the south-west—where the tribal system was prevalent and enclosure took place in very early times—than those found in the midland and eastern counties, where enclosure did not take place until comparatively recently

* "Common Land and Enclosure," E. C. K. Gonner, 1912. The reader is also referred to the following works on Enclosure, "The English Village Community," F. Seebohm, 1883. "English Field Systems," Gray, Harvard University Press, 1915.

The Loss of Ground where Numerous Fields are Enclosed by Wide Hedges.—Marshall, 1796* (already quoted), says:—"Taking into account the quantity of ground these fences occupy and injure by their drip and shade, and by the soil used in their formation, 25 ft. is the least that can be reckoned for the width of waste."

Grant† calculates that the land lost in the district he surveyed, due to the fences, is 7½ per cent., and from other data he gives, it may be calculated that the average width of the fences he dealt with was 13·2 ft., and although this suggests exaggeration, the following facts show that Grant was not overstating the case.

Grant, by actual measurement, found that the percentage of loss of area owing to the hedges (13·2 ft. wide) with different-sized fields was as follows:—

Size of Field.	*Per cent. Loss.*
Between ½ and 1 acre	17
,, 1 ,, 2 acres	12
,, 2 ,, 3 ,,	10
,, 3 ,, 4 ,,	7½
Over 10 acres	4

With fields, therefore, of 10 acres in area, the loss is only about half of what it is with 3-acre fields. Grant summarised his investigations by the remark that he found "the hedges in the 10 parishes to occupy 7 per cent., and that these shade and injure at least half as much, say 10 per cent. in all. There is no reason for farms even so small as 100 acres to lose more than 1 per cent. by its hedges."

Grant in his subsequent article‡ says:—"The hedge on the south side of the estate (258 acres) is for some distance more than 2 perches (33 ft.) wide, while the parish roads in general do not average one perch."

Grigor§ gives the average width of fence in Norfolk as 10 ft., and refers to one near Norwich as being 13 ft. wide. In Devon he had noticed some of the fences occupying more than a perch (16½ ft.), the percentage of the land thus occupied being 8 to 8½. He sums up by saying that, "on the average in Norfolk quite 10 per cent. of the land is occupied by hedges and hedgerow timber. There is a vast length and breadth of land occupied and overshadowed which ought to be producing a crop. If all unnecessary fences were cleared away and new and proper ones substituted for the remainder an accession of grain-bearing land would be available equal in extent to one of our large counties. By reconstructing the fences alone throughout England there would be gained 1,280,000 acres of land. . . . No fence should exceed 3 ft. in width."

Cambridge,‖ 1845, makes the suggestion that ditches by the side of fences are not required if the land is properly tile-drained at some little distance away from the line of the fence.

In Devon there is a shallow ditch or gutter on each side of the fence, where the land is flat and drainage water requires carrying off, which of course adds still further to the loss of land.

* See footnote p. 1409.
† See footnote p. 1409.
‡ See footnote p. 1410.
§ See footnote p. 1410.
‖ *Journal, R.A.S.E.*, 1845, "On the Advantages of Reducing the Size and Number of Hedges," p. 333, W. Cambridge.

Turner* says that thorn hedges should not be wider than 10 in. at the bottom, and 3 ft. 6 in. high. More than one arable field on the farm is not required if the land is fairly compact and not straggling—sheep may be folded where required. In small fields the growing crops on the outside acre will not yield half the average of the whole field.

Bravender, writing in 1850 on "Farming of Gloucestershire,"† says that the removal of unnecessary hedges and pollard trees would enable the farmer to bring into cultivation a considerable quantity of land that is almost waste land in its present state, and he shows what a large acreage could be added to the country by a systematic reduction in the area occupied by hedgerows.

Darby‡ refers to "These straggling fences occupying more than one-twentieth part of the entire space with briars and furze bushes and fern, nearly covering ground pretended to be in grass, the divisions of which neither deserve the names of enclosures nor fields, for they are neither."

Hall§ remarks:—"As to the waste of land by our big wandering hedges Prout calculated that by straightening up his Sawbridgeworth farm, he gained 16 acres in 450" (*i.e.*, $3\frac{1}{2}$ per cent.). . . . "When the old landlords drained and marled to improve their estates it is a pity that they did not also re-map them."

The writer took 30 measurements of the width of hedgerows in adjacent fields in the parish of Shaldon; the widths varied from 8·5 to 15 ft. and actually averaged 11·76 ft. The hedges were on hilly ground, consequently there were no ditches required. Had the measurements been taken on fairly level ground where ditches on either side of the fence were necessary, it is easy to imagine how much greater than 11·76 ft. these widths would have been.

There is no doubt that a considerable accession of cultivable land could be secured by doing away with ditches altogether as water courses alongside hedgerows—except where such ditches carry away an appreciable flow of water—and replacing them by tile drains.

The drain should preferably be run several feet away from the hedgerow (and parallel to it), or the roots from the latter soon find their way into the tiles and choke them up. This, however, is not so likely to take place where the hedgerows are placed on high banks as in Devonshire, but even in this case, in the course of time, there is a danger of the drains becoming choked by root growth. It is recommended, therefore, that tile drains should be placed 9 ft. or more away from the hedge-

* *Journal. R.A.S.E.*, 1845, p. 479.
† *Journal. R.A.S.E.*, Vol. XI., 1850, p. 176.
‡ *Journal of the Bath and West of England Society*, 1885-6, p. 147.
§ "A Pilgrimage of British Farming." A. D. Hall, 1914

rows and from 2 ft. 6 in. to 3 ft. 6 in. deep, according to the nature of the soil and subsoil. The deeper they are placed, the less likelihood there is of their becoming choked. After the drain is complete the ditches alongside the hedgerows should be filled in.

The annual cost of cleaning out the ditches, and the paring of their banks, to say nothing of the fertilising matter lost in them where cattle and sheep are allowed to have access to them, would all be prevented were the ditches done away with. The motor tractor, too, could then travel nearer the field boundary without running the risk of sinking in owing to the ditch bank giving way, as has happened in more than one case during the past season, resulting in considerable loss of time and expense in extricating the tractor.

The actual extent of the loss from hedgerows is not nearly realised by farmers. On asking a farmer how wide he would estimate the fences to be on land in his occupation, he said 4 or 5 ft. When he saw them actually measured at 11 to 13 ft. he could scarcely believe his eyes.

In the light of the above information, it would appear that Grant's figure of 13·2 ft. as the width of land lost on account of fences in Devonshire does not overstate the case, and on this basis the loss according to the size of the fields may be computed.

If it were possible to divide land up by fences arranged in the form of perfect squares, it could be shown that the *theoretical loss of land per 100 acres where the fences are* 13·2 ft. wide (the Devon basis) would be as below with fields of the sizes given :—

Size of Field in Acres.	*Acres Lost per Cent.*	*Size of Field in Acres.*	*Acres Lost per Cent.*
½	17.88	6	5.16
1	12.64	7	4.78
2	8.94	8	4.47
3	7.30	9	4.22
4	6.32	10	4.00
5	5.65		

Thus the loss in the case of a 4½-acre enclosure (the average of the Devon figures) would be approximately 6 per cent., or 6 acres lost in every 100 acres by the space occupied by the fences.

If the present fields were enlarged to 10 acres—a uniformly suitable size—by throwing down the redundant fences only, and leaving the remainder, the gain would be 6–4 = 2 acres

in each 100, or on the 48,630 acres surveyed, a total of 973 acres. In actual practice, however, the gain would be considerably greater, because fields are not square and hedges are not straight. The more the length of the field exceeds its breadth the greater will be the ground lost, as the following table shows :—

Fields of 10 *acres each with the following approximate dimensions in yards.*	*Description.*	*Acres Lost per Cent. where width of Fence is* 13.2 *ft.*
220 × 220	Perfect square ..	4·00
155 × 312	Twice as long as broad.	4·24
127 × 381	Three times as long as broad	4·61
110 × 440	Four times as long as broad	5·00

If fields of minimum size of 10 acres result in an extra loss of 1 per cent. when they are four times as long as broad as shown above, it is evident, when the size is as small as 4½ acres or even less, that instead of a 6 per cent. loss due to hedgerows, it may, in actual practice, be easily as much as 7 or even 8 per cent.

Of 12 adjacent fields in the parish of Kingsteignton, the writer found the length in proportion to the breadth (reckoned as 1) to be, respectively, 2, 2, 3, 3⅓, 3½, 4, 4, 5, 5, 7, 8 and 10, or an average length to breadth of about 5½ to 1.

Add to this the loss due to fences being curved and meandering, also that many fences form re-entrant angles probably owing to the earlier removal of sub-dividing fences. Add again also the large number of field corners which cannot be regarded other than as waste ground. Finally, there is a considerable waste of land not previously referred to, viz., that occupied by lanes and approaches to fields which is always greater with small fields, and which was very noticeable in the survey made by the writer.

Loss Due to the Surface Soil having been Removed to Form the Fence.—Grant thus refers to this point :—"For nearly a ridge on each side of the bank, the corn is not worth reaping . . . the soil on each side of the hedge is thinner because the bank has been made of material taken therefrom."

While Grigor says :—"There is no doubt that the broad ridges of soil thus formed as banks whereon the plants are placed are made at the expense of surface soil on each side of the fence line, which consequently becomes impoverished and hungry."

It is natural to assume that the hedge banks would be built up by turf or soil taken as near as possible to the proposed line of fence, and not from soil which had to be transported

some distance, but there is abundant proof in the extreme thinness of the surface soil near the hedgerows on fairly level ground that when the banks were made the materials for them were obtained from alongside. Many farmers, moreover, consider it wasteful to apply any manure alongside the hedgerows, thus further tending to increase the area of waste ground.

Loss Due to Shade.—Next to the acreage lost on account of the ground occupied by the actual hedge bank is that ground which is shaded by the coppice growth on the top of the banks and the timber trees which are allowed to mature, and which together seriously affect the growth of crops underneath their shade.

Grant says :—"For nearly a ridge wide on each side of the bank the corn is hardly worth reaping," and "they shade and injure at least half as much . . . they prevent the free circulation of air and prevent corn drying for harvesting."

Grigor :—"It is said the fences are necessary for shelter, but such shelter is highly injurious to the crops near, where free circulation of air is impeded, rust, mildew, and blight are prevalent . . . What happens towards the end of summer when heavy rains are experienced there may probably be intervals with wind and sunshine sufficient to dry the crops if they were exposed on all sides, but being surrounded by fences remain damp for several days—a prey to mildew and sprouting grain. . . . The greatest injury is due to the timber trees contained in the hedges, on account of the fertilising material they absorb, and also because of the drip of their branches. A space of land equal to that shaded by a tree is as completely lost to the farmer as if it were actually occupied by a fence. Take away your trees and hedges and you gain every year a quantity of nutritious food equal to the annual increase of their substance. Trees in Norfolk occupy rather more ground than the hedgerows in which they grow. From measurements taken in Norfolk, therefore, it appears that on the average in every 100 acres of land in the county 10 acres are occupied with hedges and hedgerow timber. In spring and autumn, when the sun is away from the vertical, the shade produced is very injurious, especially for ripening and drying corn. . . . Many hedgerows produce great transpiration, the atmosphere is damp, hence blight, smut, rust and mildew are prevalent."

Turner* states that in large fields, the soil dries quicker for cultivation purposes than in small ones, where the land is imprisoned by high hedges, and that there would be few headlands in larger fields. In small fields the growing crops on the outside acre will not yield half the average of the whole field.

Acland :—"In many cases the hedgerows in Somerset are so close that the roots of the elm trees must meet underground. . . . Owing to the shelter and the humid conditions caused along the hedgebanks sheep suffer considerably more from fly attack. . . . Barley and turnip crops in a dry summer grow nothing within 20 yards of a hedge

* *Journal, R.A.S.E.*, 1845, "On the Necessity of Reducing the Size and Number of Hedges," p. 479, T. H. Turner.

it contains a very considerable quantity of timber. Turnips are lmost always invariably mildewed."

Punchard* states that the need of shelter is urged, though a greater roportion of fences is found in the sheltered valleys and on the best and

Hall :—" There must be an enormous waste from these banks : not nly is the area they actually occupy considerable, but for many yards hey exercise an evil influence upon the corn, rendering it weak and lighted during growth, and slow to dry during harvest. A big hedge o a small field is quite enough to cause the repeated loss of the rare pportunities of getting home a crop that do occur even during such a ainy time as the August of 1912, when only the farmers who seized ipon bare *possibilities of harvest saved their crops before the deluges* hat marked the latter part of the month."

The following statement by Marshall in 1796 is, in its essence, so imilar to the above quotation from Hall, and almost to the letter lescribes the writer's own experience in Devon during the past harvest, hat it is placed last as being quite up to date :—" The corn of narrow, lose fields, and everywhere under high trees, is by the many heavy ains much lodged, and in some places grown through by weeds, while n large, open fields, and where the hedges are low, very little damage is one, but at present I feel this inconvenience still more sensibly. We arried the middle of H 1 (wheat) the day before yesterday (Aug. 25th) in ood order, but about a load under a high hedge was still damp and was bliged to be left in the field yesterday. Some of the sheaves are opened o give them air, a heavy storm came on before they could be reset up, ut they are now growing into mats as they lie on the ground; had it iot been for the high hedge they would have all been up at the barn. The oats of A under a high, thick hedge are mere dung; under one which vas cut down last year about 4 ft. high, they are little worse for the veather.

The Cost of Upkeep of the Fences is Considerable.—Grant :—" These ences are expensive to erect, and also to trim and keep in repair; the ost of keeping in order may be taken as equivalent to 5 per cent. of the ental (of the land they enclose). . . . A much larger number of gates re required with their upkeep and renewal."

Grigor :—" There must be an entrance to each field, and therefore, n most cases, a gate; these have to be repaired and replaced."

Punchard, on the Third Prize Farm at Staverton :—" There are 200 ates, and these with posts lock up considerable capital which could be ised elsewhere."

The writer calculated in the Shaldon district of 355 fields embracing only 1,168 acres that, if the fields were increased to an average size of 10 acres, 118 gates and 336 posts could be lispensed with, and their cost of repair and renewal abolished.

The Waste of Labour Involved.—Grant :—" The labour of every operation of the farm is most materially increased."

Grigor :—" These fences are expensive in labour, frequent turnings are necessary by the ploughmen. The time expended in cultivating small fields is enormous."

* *Journal, R.A.S.E.*, 1890, " Farming in Devon and Cornwall," p. 531, F. Punchard.

Hall:—"Again the presence of small, irregularly-shaped fields forms one of the great obstacles to really economic farming in England. It is not merely that time is wasted over the constant turnings, but a man gets thereby into a retail way of looking at things, and puts out of his consideration all schemes for handling crops on a large scale with the help of machinery. In most parts of England, the necessary preliminary to any capitalist exploitation of the land, such as would be extremely profitable on the thousand- or two thousand-acre scale, would necessarily begin with a complete reconstruction of the existing divisions of the land."

It is obvious to anyone practically acquainted with the operations of ploughing, harrowing, rolling, drilling, hoeing, mowing by machinery, raking, etc., that the loss of time in turning the implements used in these processes where the fields are small far exceeds that which obtains in fields of larger size. Add to this the more frequent transportation of implements from one field to another, including the partial dissembling and re-assembling, as in the case of the self-binding harvester and the artificial manure distributor, to mention only two of the newer types of farm machinery, and the consequence is a considerable loss of time and much unremunerative labour, which *necessarily increases the cost per acre of all the cultural operations, in small fields, to a figure much beyond that* applicable to fields of larger size. When the latest aid to field cultivation—the motor-tractor—is included, with the necessity for the wider headlands involved, surely the small arable field is doomed.

Numerous Hedgerows Offer Asylum to Various Farm Pests.—Grant:—"*They harbour birds and vermin which injure the crop.* . . . They form nurseries for weeds."

Grigor:—"They form nurseries for thistles, nettles, docks, dandelions and seeds ready to be distributed by every wind. . . . They harbour snails and slugs, also birds and their nests. . . . Sparrows and *greenfinches damage early barley, wheat and peas* . . . on small fences birds do not alight for long."

Darby:—"providing for snug nurseries for all manner of filth . . . infested with pests of every kind."

Hall:—"Hedges, again, are always harbours of weeds and of those growing plagues—rats and sparrows, and the only good that can be said of them is that they provide shelter for stock."

Besides the vermin mentioned in the above extracts, rabbits should be added. The banks surmounted by hedges form most admirable grounds for the burrowing and breeding of rabbits. Even on the stiffer soils the hedge banks are practically always dry, and it does not take long, if the rabbits are not regularly and efficiently checked, for these hedge banks to become veritable rabbit warrens. That this is no exaggeration, the

" bags " obtained during the winter months by ferreting and trapping abundantly testify. It does not seem to be so generally recognised, however, that the hundreds of rabbits thus accounted for, often on quite small farms, have been raised at the expense of crops grown on the farm, to say nothing of the damage done to countless numbers of young plants of corn, roots, clovers, etc., which, eaten off in the early stages of growth, account for a much greater loss of crop than when devoured at, or just before reaching, maturity.

Conclusions.—It may be assumed that the figures given by Grant, both for the width of the fences and for the average size of the fields, are fairly applicable to the whole of the enclosed land in the county of Devon, which, excluding water and mountain and heath land used for grazing, is given as 1,208,826 acres.* The loss at the low estimate of 2 per cent. would be 24,176 acres. If the redundant fences only, *i.e.*, those forming enclosures less than 10 acres, were thrown down, this 24,000 acres would at once be added to the cropping capacity of the county, and if it were possible to till it all with wheat, producing an average crop of 32 bush. per acre, the total increase of food thus supplied would be 768,000 bush., sufficient to provide 100,000 men with bread for a year.

Were a bold course adopted, and the remaining hedgerows replaced by neat fences, which need not occupy, at most, more than one-quarter of the present average width of 13·2 ft., viz., 3·3 ft., there would be available for food production an extra 3 per cent., or a total of 5 per cent., or 60,000 acres, which, of course, would feed a proportionately larger number of men.

As already stated, the south-west is distinctly a country of small fields. The fields are smaller and hedgerows wider, perhaps, than those in most counties of England and Wales. It would not be permissible, therefore, to apply the same average all over the country ; although it has been shown that Gloucester, Somerset, and many of the Welsh counties contain fields of small size bounded by wide hedgerows. It is possible that, since the various accounts referred to were written, some of the hedgerows have been removed, but much has certainly not been done in this respect in the county of Devon. An estimate, however, based on a 2 per cent. increase, will by no means be too high a figure for the whole of the

* Board of Agriculture and Fisheries, Acreage and Live Stock Returns, 1917.

country, were redundant hedgerows removed. This would mean an accession of more than 500,000 acres for England and Wales, and supposing half this acreage could be sown with wheat, a yield of 8,000,000 bush. extra might safely be counted on, say sufficient to provide bread for over a million people for a whole year, to say nothing of the productive value of the remaining half, if in good grass.

It has been assumed that no arable fields should be less than 10 acres in area, except for very special purposes, and it may be stated that with a fence not exceeding 3 ft. in width (which is more than ample), the actual area covered by the fence per 100 acres, in the case of fields set out in squares, would be less than 1 per cent.; also that 4,400 linear yds. (or 2½ miles) of fencing would be required to re-enclose each 100 acres properly and completely.

Whether arable fields should be so small as 10 acres each is doubtful in these days of mechanical cultivation. Many farms in the south-east of the country have the whole of the arable in one large field, and when green crops are grown these are folded off for consumption. If the fields were taken on a 20-acre basis the fencing required per 100 acres would only be a little over 1¾ miles.

An Example from Japan.—Between the years 1900 and 1914 Japan set about the redivision of lands admitting of cultivation,* with the object of "increasing the profits to be derived from the utilisation of cultivated land." Laws were passed which provided "for the exchange and redistribution of lots, for a change in the configuration of holdings, and for the transformation and construction of roads, adjacent zones of territory, canals, etc." Both the owners of the property and the occupiers possess the right of requesting redistribution.

The total area already dealt with is something over 1,000,000 acres, comprising some 7,000 lots of land, averaging 144 acres each. The result has been a gain of 13·75 per cent. in cultivated land, due to the transformation of non-irrigated fields into irrigated ones, and the conversion of forest, ponds, and uncultivated land into irrigated and non-irrigated fields, and also to the damming or draining of lakes and lagoons.

An important result of the work of redividing lands has been the transformation of paddy fields, yielding one crop of rice per annum, into those yielding two crops per annum, viz.:—rice followed by one of barley, wheat, rye or beetroot.

* *International Review of Agricultural Economics*, May, 1918, pp. 409 *et seq.*

In fact the area of land yielding two crops per annum has been increased by 39 per cent. The production of rice has increased by 17 per cent. as the result of the redivision.

Finally, the following advantages have been secured: increased means of communication, the convenience of using canals for transport, the economy of labour and the increase in the value of the land.

The results obtained in Japan would not, of course, be the same in detail in this country, but the principle of increasing the food-producing area in the two island countries should apply equally in both cases. If it has paid Japan, and there is no doubt of this, to carry out a comprehensive scheme of redivision, it will pay Great Britain likewise, and the work necessary for its accomplishment appears to be exactly of such a kind which a demobilised army, used to trench digging, could efficiently carry out during the interval of possible lack of employment which is likely to occur between the change from military to civilian occupation. What is needed is Government action in the matter, for if left to private initiative there is no reason to assume that the work will be carried out to a greater extent in the future than it has been in the past.

The Cost.—The cost in Japan, spread over the whole area, was about £8 per acre, but it is calculated that 80 per cent. of this expenditure was absorbed by works of construction, while the remaining 20 per cent. represents costs of management and other accessory expenses.

The cost of throwing down hedgebanks in Devon before the War was from 2*s.* 9*d.* to 3*s.* per rod (5½ yds.) by hand labour. This cost now would probably be more than doubled. At 6*s.* per rod, the cost per mile would be £96. One mile long by 13·2 ft. wide would be 1·6 acres, which at the above figures would be £60 per acre of land gained. On the former assumption of a gain of 2 acres per cent. by throwing down redundant hedgerows, there would be a total cost per 100 acres of holding of £120, or 24*s.* per acre.

It is quite feasible, however, considerably to reduce the cost by the aid of mechanical power, such as some form of steam navvy, trenching machine, or even by strong grappling irons attached to steel ropes wound round the drum of a steam or motor-traction set of tackle, by means of which many of the hedgebanks could be pulled over, and the material subsequently worked by power and levelled, on the American plan, by machinery.

Difficulties.—In a scheme of the type outlined above, there are, of course, numerous difficulties. One of the most formidable is that of mixed ownership, so prevalent in this part of the country.

The writer's attention has been recently drawn to the case of a local farmer, who rents altogether about 150 acres of land under six landlords. His holding, if it can be so termed, consists of 52 fields. Of the 27 fields belonging to landlord A, 15 lie in one block, 3 in another, 2 in another and 2 in another. The remaining 5 fields are each isolated and surrounded by land belonging to other owners.

Of the 10 fields belonging to landlord B, 3 are in one block, and the remaining 7 are each isolated and surrounded by land belonging to other owners.

Of the 7 fields belonging to landlord C, there are 2 in one block, 2 in another, and the remaining 3 are each isolated and surrounded by land belonging to other owners.

Of the land belonging to landlords D, E and F, there are 4, 3, and 1 fields owned by each, respectively, and each of these 8 fields is isolated and surrounded by land belonging to other owners.

When one considers that this farmer's land is in a very hilly district, the time and labour absolutely wasted in getting from one field to another can be more easily imagined than described. This, however, is by no means an isolated example, and when the various ownerships are indicated in different colours on the 6-in. Ordnance Survey Maps, a most surprisingly complex patchwork arrangement is revealed, which further emphasises the importance of making the increase of the size of fields and the redistribution of the land a matter of real national concern.

THE CULTIVATION OF BASKET WILLOWS.

A LARGE area of the low-lying land of the river valleys of this country is too wet in character to admit of being treated as tillage, or of being used as pasture except during the drier months of the year. This land could probably be more profitably devoted to willow cultivation than to the growing of any other crop.

Basket Willows will not thrive on land which is water-logged for long periods, but floods are beneficial provided an adequate drainage system exists for the rapid removal of excess water.

Soil.—From the large number of cultivated willows varieties may be selected which will thrive on any class of soil except peat. Rich, heavy loam soils with substrata of clay are most suitable, but lighter soils prove satisfactory when other fertility factors are present. If willows are grown on peat the quality of rods produced is too poor, and the life duration of the plants too short, to admit of profitable cultivation.

Preparation of the Land.—The objects to be attained are :—

1. The removal of weeds ;
2. Pulverisation and the loosening of the top 10 in. (at least) of soil, so that the cuttings may be inserted to a suitable depth.

In the past the usual method of preparing the soil was by means of the spade.

Double-spit digging, or trenching, whereby the underspit becomes the surface soil (the turf layer being buried, grass side downwards, beneath it), is the most effective method of treatment, because the soil is thus deeply worked and can be kept clear of weeds for the first two years at small cost and to the great advantage of the young plants. Single-spit digging, or bastard trenching, to a depth of 10 in., care being taken to invert the sod, has been found to be satisfactory.

In some cases land can only be prepared by means of the spade, and the only objections to this practice as a general method are the heavy expenses thus incurred, and, with the labour usually available, the slow rate at which the work is performed.

Land may be prepared by means of the plough. Four or six horses are sometimes needed to turn a furrow slice completely in one operation, but a more efficient method of using this power might be to adopt the method of double ploughing, whereby the turf turned by one plough becomes buried under the lower slice turned by the other.

It is probable that where the land is sufficiently firm, steam ploughs would do satisfactory work.

In places where rushes and other deeply-rooted perennial plants abound, the land would need to be fallowed during the summer preceding the planting season.

Drainage.—A ready outflow for surplus water should be secured by scouring the neighbouring permanent watercourses. From these, open drains should be cut across the land in such directions as to secure effectual drainage of the soil and the least interference with later cultivation operations. Pipe drains may often be advantageously laid, especially at outlets.

Choice of Varieties.—About forty varieties of Basket Willows are grown commercially in this country, and many of them might be advantageously discarded. Although wide differences exist the varieties may be readily grouped according to their appearance and economic value. Such grouping generally agrees with their botanical classification.

HARD RODS OR FINE TOPS (*Salix triandra*).—This type includes varieties possessing characters most desired by the makers of the best quality baskets, as well as varieties of little value. They find greatest use as one-year-old rods. The chief varieties are: Black Maul, Black German, French, Italians, Dutch, Stonerods, Whissenders, Long Bud, Newkind, Mother Spaniards, Champion and Glibskin

SOFT RODS OR FULL-TOPS—OSIERS PROPER (*Salix viminalis*). Compared with the *triandra* varieties the rods are longer, thicker, less tough, less pliable, and of poorer working quality; the yield is greater, but the value per equal weight is less. The rods are specially suitable as staking for the framework for heavy basketry, and for the making of various kinds of baskets where *triandra* rods would be less suitable and unnecessarily expensive. The chief varieties are: Longskin, Brown Merrins, and various "Osiers" frequently distinguished in name and character by the colour of the bark in winter.

BITTER WILLOWS (*Salix purpurea*).—The rods of this species differ from those of the preceding species in being bitter, tougher, more supple, more finely tapering, freer from side shoots, and, in the chief varieties, shorter. They are suitable for conversion into "White," and as "Buff" are pale in colour. The rods are unexcelled in the making of the fine quality of small basketry. The chief varieties cultivated are: Old Dicks or Red Buds; Light Dicks, Dark Dicks, and Kecks.

BLACK TOPS (*Salix hippophæfolia*) is a variety of good quality suitable for cultivation on sewage farms, because its dense foliage checks the growth of weeds.

"BELGIAN RED" AND "GOLDEN WILLOW" (*Salix alba*) are widely grown and are used as "Green" by market gardeners and nurserymen for tying purposes.

A prospective grower, in selecting varieties for planting, should have in mind :—

1. The varieties best suited to his land ;
2. The local supply and the kind of rods locally required ;
3. Varieties of good quality which would command a wider market ; and
4. The condition (green, white, buff) in which he ultimately intends to market his crop.

Cuttings or Sets.—Cuttings or sets are obtained by cutting either one-year-old or two-year-old rods in lengths of from 12 to 16 in. The best cuttings are taken from young, healthy heads. All the plants in the same bed should be of the same variety, because difficulties arise when willows are mixed and the value of such crops is depreciated.

Distance Apart.—The distance apart at which planting is done depends upon :—

1. *Variety.*—Many varieties differ greatly in their yields and in the size of the crowns which they develop. Consequently the spacing should be in accordance with the amount of growth made.
2. *The Methods of Cultivation* to be employed during the lifetime of the crop. The rows should be sufficiently wide to allow a horse to walk without stepping on the heads when horse hoeing is intended, but closer planting is possible when the ground is to be worked by hand.

In general, from 18,000 to 30,000 cuttings are required to plant one statute acre. The following distances apart are given for guidance, and from these the exact number of cuttings needed can be calculated :—

For varieties of *S. viminalis*, 22–26 in. by 16–18 in.
,, *S. triandra*, 20–24 ,, 12–16 ,,
,, *S. purpurea*, 20–24 ,, 10–12 ,,

These areas for individual plants should be maintained as nearly as possible in cases where "planting on the square" is adopted, *i.e.*, where equal distances between adjacent rows and adjacent plants in the same row are maintained. This system enables hoeing to be performed in two directions, but can only be adopted advantageously in cases where the size and shape of the fields permit and open drains are not essential. It is better to err on the side of too close than too wide planting, because the yield is increased, the closer foliage acts as a greater check on the growth of weeds, and the rods are straighter at the butts.

Planting.—This operation may be carried out at any convenient time between the months of November and March. The land should be harrowed and the cuttings inserted so that not more than 2 in. remain above the ground after the soil has been firmly pressed round them. Protection for the hand is afforded by the use of a leather pad. In order to facilitate cleaning, tillage, etc., it is important that adjacent rows should be equidistant throughout their lengths. This may be achieved (*a*) by means of a planting chain or long line, (*b*) by means of markers attached to the framework of a horse-drawn wheeled implement. During the growing season the land should be kept clear of weeds, and the surface layer of soil retained in a pulverised condition by hoeing, both by hand and by horse hoe.

Cutting the Crop.—The crop may be cut after the first leaf-fall, and before the second season's growth commences, or may be deferred until after the second season's growth has been completed. Special knives are used for the purpose. These should be kept sharp, and the rods should be cut close to the stem in this and in all subsequent years. Thus, well-shaped heads are developed close to the surface of the ground, whereby cutting is facilitated, a sufficient distance between plants is maintained for cultivation operations, and the chances of the plant becoming a host for injurious insects and fungi are diminished. The cut rods are tied in bundles, and removed from the ground.

Later Treatment of the Growing Crop.—Willow holts should be kept clean and fully planted. If allowed to become infested with weeds, a reduction in yield and quality follows, the life of the holt is considerably shortened, and the expenses incurred in cutting and sorting are increased.

Weeds may be removed by shallow digging and by horse and hand hoeing. The most efficient method of dealing with weeds is that practised by the Mawdsley (Lancashire) willow growers. Before growth commences, a ridging plough fitted with a stout, broad share, working to a depth of 2 to 3 in., is drawn along the intervals between the rows. Weeds are thus cut and the upturned layer of soil placed alongside the heads of the plants. After completion of the operation the land resembles a ridged-up potato field. The soil becomes dried and tempered, and is easily drawn back to its original position by means of scufflers. Weeds growing in the rows are removed by hand hoeing.

Full-length rods (full sets) are inserted in the spaces where plants have failed to grow.

Preparation of the Rods for Sale.—Rods may be sold as "Green," "Brown," "Buff" or "White." The freshly-cut crop "GREEN" may be allowed partially to dry in stook in the field. The bundles are afterwards stacked in a well-roofed shed or in the open air. When drying is completed the rods are known as "BROWN." If rain-water gains entrance to stored rods it rapidly causes serious damage, so that stacks in the open should be well covered and thatched. In converting "Green" to matured "Brown" 50 per cent. loss in weight occurs.

"BUFF" rods are prepared by removing the bark from either "Green" or "Brown" rods after they have been boiled in water for from two to five hours. They are then dried and intensified in colour by exposing them to sunlight. A buffing plant consists of a tank of approximately the following dimensions: 9 ft. long., 2 ft. 9 in. wide, and 2 ft. 6 in. deep. Iron boilers set with bricks, with a furnace beneath and a flue communicating with a chimney, are in common use, but in some places the bottom plate only consists of iron. The sides and ends are constructed of wood 2½ to 3 in. thick, and are bolted or bracketed to the plate. The joints are tongued and grooved, and the tank is made water-tight by means of red lead. A suitable boiler forcing steam through closed coiled pipes within the tank might work with greater efficiency. The boiling tank should be erected in a shed of suitable size, or a special room should be provided to give weather protection to the peelers.

The peeled rods are spread out in rows in a field, being supported in an inclined position by a series of lightly-constructed temporary fences and allowed to remain until dry and the desired intensity of colour has been reached. The partially-dried rods are placed under cover, graded according to length, and when thoroughly dry are tied in bundles and stored. The storage room should be weather-proof, dry, and well ventilated. Serious damage will occur, owing to the development of moulds, if buffed rods are stored closely when in a damp condition and when dry rods are stored in a damp place. About 75 per cent. loss in weight occurs in converting "Green" to "Buff."

"WHITE" rods are prepared by removing the bark from "Green" rods. This operation is carried out in spring directly after the flow of sap has released the bark throughout its length from the underlying wood. At this stage the rods are cut from the heads and at once peeled by means of a "*break*." The essential parts of a break are a pair of straight upright iron rods suitably mounted on a stand and working in contact along their

inner edges by means of springs. Sufficient pressure is exerted during the passage of a willow rod between the jaws to break the bark on opposite sides. The bark is then removed by hand. Breaks differ in design, but the working principle is the same in all.

The period during which any variety may be "peeled from the head" is about 10 days, but the peeling period can be extended until July by adopting the following methods:—(1) By growing several varieties which arrive at the proper peeling condition in succession; (2) by couching; (3) by pieing; (4) by pitting.

Couching.—Spring-cut rods, in the condition for being peeled, are tied in bundles, a layer of which is laid on the ground, the tops being directed the same way. A similar layer, reversed in direction, is placed above with the butts at about the centre of the length of the lower layer. This order of arrangement of layers is continued until the stack is about six courses high. By thus directing all the tops outwards the rods do not suffer damage by becoming overheated. Drying is prevented by the addition of a liberal quantity of water and by covering the stack lightly with old peelings.

Pieing.—The bundles are arranged one layer thick in a sloping position on the ground, the tops of one row well overlapping the butts of the row immediately in front. The pie is then loosely covered with old peelings and kept moist by being watered when required.

Pitting.—Rods cut in March or earlier are tied in bundles and rested on their butts in dykes or specially-constructed, rectangular, flat-bottomed ponds through which flows a slow and continuous stream of water 4 to 8 in. in depth. In spring roots are formed and growth commences. Under this treatment rods remain in a satisfactory condition for peeling until August. Rods are peeled for "White" in the following order:—(*a*) From the head; (*b*) from the couch; (*c*) from the pie; (*d*) from the pit.

The freshly-peeled rods are dried in the open as in buffing, graded according to length, tied in bundles, and finally stacked in dry quarters.

Cost of Growing and Returns Obtained.—The wide variations in the value of land as determined by such factors as position, condition previous to preparation, state of fertility, the amount of labour available for cultivation, and the present abnormally high value of willows, do not permit at the present time of a

comprehensive reliable statement being made to meet all cases. The following summaries taken from the Board's publication on the Cultivation of Osiers and Willows (1913)* will serve as a guide :—

FIRST YEAR

Expenditure.	£	s.	d.	*Receipts.*	£	s.	d.
Preliminary expenses of ploughing	4	0	0				
Cuttings	15	0	0				
Planting	1	5	0	2 tons "Green" at £4 2s. 6d.	8	5	0
Rent and rates	1	15	0				
Labour and other expenses ..	4	15	0				
Total	£26	15	0		£8	5	0 per acre.

SECOND YEAR

Total expenses	£7	5	0	4 tons "Green" at £4 10s. ..	£18	0	0 ..

THIRD YEAR.

Total expenses	£7	5	0	6 tons "Green" at £4 10s. ..	£27	0	0 ..
Total for the three years	£41	5	0		£53	5	0 ..

The expenses and returns differ much according to circumstances, but willow growers regard the crop as satisfactory when the total expenditure for the first three years is covered by the receipts for the same period.

It is more profitable to the grower to dispose of his crop either as "White" or "Buff" rather than as "Green," as the following table shows :—

Green.	*White.*	*Balance in favour*
3 tons worth £15 ..	Converted to 1 ton worth £24, at cost of £4 (= total of £19).	£5
Green.	*Buff.*	
3 tons worth £15 .	Converted to 1 ton worth £23, at cost of £5 (= total of £20).	£3

The duration of a willow bed depends upon the suitability of the land and on the amount of care bestowed upon the crop. Suitable land will continue to yield satisfactory crops for 2[illegible] years, and occasionally for a longer period.

During the life of the crop the annual returns vary greatly owing to damage which may arise from frost, storms, ground game, insects and fungi, adverse growing seasons, and t[illegible] economic factors, but for a series of years on such land as should be used for the purpose, few other cultivated crops yield more satisfactory profits to the grower.

* Now out of print.

There are prospects that willow growing will be profitable for many years to come, because :—

1. The supply of home-grown rods will continue to fail to satisfy basket makers' requirements owing to the permanently dilapidated condition into which established beds have fallen, both at home and on the Continent.
2. Little new ground has been planted since the outbreak of war.
3. Basket-making as a national industry may be expected to grow, since it affords suitable employment for many partially-disabled ex-service men.
4. An export trade in certain varieties can be developed.

Security of Tenure.—As a large amount of capital is sunk in establishing the crop, the tenant of a holding held on the usual yearly tenancy should not embark on the work except with the previous written consent of the landlord to the improvement which, under the Agricultural Holdings Act, 1908, is necessary to enable the tenant to claim compensation from the landlord on the determination of the tenancy.

(This Article is also issued as the re-written form of Leaflet No. 36.)

INTENSIVE CULTURE.

THE following is a resumé of a Paper read before the Agricultural Club by Mr. R. R. Robbins on 8th January, 1919 :—

DESCRIPTION OF INTENSIVE METHODS OF CULTIVATION.—Intensive methods of cultivation may, of course, be applied to any form of culture, whether it be farm, market-garden or nursery crops. To many the term intensive culture is a synonym for French gardening, which is, perhaps, the most intensive form of culture. Others might be inclined to identify the term with culture under glass, and a few might associate it with market-gardening on the old lines, *i.e.*, by spade cultivation ; while the 1,400,000 allotments provide one of the most striking and useful illustrations of intensive culture.

The definition I propose to adopt for the present purpose is the production of fruit, vegetables, flowers, plants, trees, shrubs and seeds on a large or small scale, under glass or in the open—a definition which is perhaps best summed up by the term "horticulture." The amount of labour required per

100 acres for any of the purposes mentioned, as compared with the amount required per 100 acres for a well-managed mixed farm, is sufficient justification for regarding them as forms of intensive culture.

LABOUR REQUIRED.—The following estimate of the number of men required per 100 acres on a well-managed holding, devoted to (*a*) mixed farming, (*b*) fruit and vegetables, (*c*) culture of fruit, vegetables, etc., under glass, may be of interest.

(*a*) Mixed farming	3–5 men.
(*b*) Fruit and vegetables	20–30 "
(*c*) Glass	200–300 "

STATISTICS.—The absence of reliable statistics concerning horticulture has probably been a drawback in securing State support for the industry in the past, but now that the recently-formed Chamber of Horticulture has engaged the services of a whole-time official to deal with this matter, it is hoped that in the not very distant future, fuller statistical data will be available.

Although no reliable and complete statistics are available concerning the magnitude of the industry, data are available to give some idea of its importance.

"Market Gardens and Nursery Grounds" disappeared from the Schedule of the Board of Agriculture's Returns in 1897, owing to the fact that market-garden crops often form part of the recognised area of an ordinary agricultural holding, and it was often practically impossible to separate such areas from less highly-farmed surfaces under the same occupation.

Small fruit orchards, however, still continue to receive attention in the Board's Report, and under the heading "Green Crops" are included some market-garden crops which are

——	Great Britain.	England.	Wales.	Scotland.	England and Wales.
	acres.	acres.	acres.	acres.	acres.
	MARKET GARDENS.				
1872	36,204	32,937	850	2,417	33,787
1877	37,849	34,464	446	2,939	34,910
1887	62,666	57,572	860	4,234	58,432
1896	96,696	88,912	1,520	6,264	90,432
	NURSERY GROUNDS.				
1872	11,779	8,906	790	2,083	9,696
1877	11,952	9,961	367	1,624	10,328
1887	12,478	10,669	277	1,532	10,946

roduced on a fairly large scale. The foregoing summary rom the Board's Returns of the total areas under market ardens and nursery grounds is of interest.

The nearest official attempt to gauge the quantity, value nd yield per acre of some of the most important fruit and arket-garden crops will be found in the Agricultural Output f Great Britain (Cd. 6277, 1912). The figures quoted are or the year 1908 and are evidence of the national importance f this branch of the industry.

Crops.	Quantity		Value.		Yield per Acre.
	tons.	cwt.	£	£	cwt.
Potatoes ..	3,918,000	—	9,892,000	—	—
Cabbage ..	954,000	—	760,000	—	—
Kale	28,000	—	26,000	—	—
Brussels sprouts	10,000	—	56,000	—	—
Broccoli and Cauliflower	28,000	—	80,000	—	—
Carrots ..	129,000	—	159,000	—	—
Onions ..	18,000	—	106,000	—	—
Rhubarb ..	18,000	—	181,000	—	—
Celery ..	22,000	—	72,000	—	—
Mustard ..	—	—	107,000	—	—
Asparagus ..	—	—	42,000	—	—
Parsnips ..	—	—	36,000	—	—
Lettuce ..	—	—	34,500	—	—
Seakale ..	—	—	32,000	—	—
Beetroot ..	—	—	26,000	—	—
				11,609,500	
	cwt.				
Hops	470,761	—	1,059,000	1,059,000	—
Seeds	—	—	132,000	132,000	—
Other vegetable crops ..	—	—	352,000	352,000	—
Flowers ..	—	—	121,000	121,000	—
Strawberries ..	829,000	—	1,036,000	—	29
Raspberries ..	206,000	—	309,000	—	22
Black currants	56,000	—	84,000	—	9
R. and W. currants ..	68,000	—	69,000	—	18
Gooseberries ..	347,000	—	208,000	—	21
Other kinds ..	252,000	—	252,000	—	—
		1,758,000		1,958,000	
Apples ..	4,486,000	—	1,490,000	—	26
Pears	183,000	—	90,000	—	19
Cherries ..	176,000	—	194,000	—	15
Plums ..	715,000	—	357,000	—	46
Other kinds ..	812,000	—	406,000	—	—
Total orchard fruit ..	—	6,372,000	—	2,537,000	—
Crops under glass (155 acres)	—	—	—	150,000	—
				£17,918,500	

It is stated that the fruit crop for the year under review was below the average, but it will be seen that the total estimated value of the above fruit and market-garden crops for 1908 was a figure approximating to £18,000,000.

Apart from Government documents, by far the most comprehensive and intelligent account of the movement under consideration comes from the pen of Mr. E. A. Pratt in a work entitled "The Transition in Agriculture" (published by John Murray, 1906). His chapters on the Fruit Industry, Flowers, Bulbs, Production under Glass, Market Gardening, Special Vegetable Crops, Evesham and its Story, make not only intensely interesting reading but supply evidence of the magnitude and importance of intensive culture. It is now 13 years since Mr. Pratt's book was issued from the Press, and I suggest that an enquiry by a number of investigators working under the combined supervision of the Board of Agriculture and the Chamber of Horticulture, and planned somewhat on the lines of the Board's recent inquiry as to wages and conditions of employment in agriculture, would amply justify the expense and labour involved. Nothing but a thoroughly organised and systematic inquiry could reveal the extent and importance of the contribution made to the food supply and to the health of the nation by intensive cultivation, especially during the past four years.

The history of food production under glass provides, perhaps, the most romantic story in the annals of horticulture.

Less than 50 years ago the largest existing greenhouse was 200 ft. long by 20 ft. wide. To-day the area under glass cannot be less than 2,000 acres. The capital expenditure on a pre-war basis for an acre of glass is approximately £2,000. Thus the capital invested in this branch of horticulture—having regard to the initial outlay involved, and the working capital required to run the business—would probably be not less than £4,500,000 on a pre-war basis.

INTENSIVE CULTIVATION OF SPECIFIC CROPS.

Tomatoes.—Less than half-a-century ago the tomato plant was grown only for decorative purposes in greenhouses, and the fruit was no more considered to be edible than is now the berry of the deadly nightshade. To-day there are probably upwards of 1,000 acres of glass devoted to tomato culture. An average crop under glass yields from 30–35 tons per acre, per annum. The annual output, therefore, would be from 30,000–35,000 tons.

Cucumbers.—Prior to the War, many miles run of greenhouses were used for cucumber growing, and the cucumbers were consumed not only in the British Isles, but were sent in large quantities to Holland, Denmark, Germany and other European countries.

An acre of glass devoted to cucumbers has been known to produce as much as 80 tons during the season. An average crop would probably be 60 to 70 tons.

Grapes.—Forty years ago grapes used to come to the market in punnets containing 2 to 3 lb. each.

Until thirty years ago, old grapes at and after Christmas time were unknown. They are now retained on the vines until the end of March and early April, when the new crop is about to commence. Considerable quantities of English grapes are shipped to the United States.

The approximate weight per annum of grapes grown under glass in England is 2,000–2,200 tons.

Equally interesting and striking figures could be given concerning the cultivation of flowers and plants under glass, but sufficient has been said, I think, to warrant the statement that the cultivation of crops under glass is an industry of national importance.

Some striking figures were given by Dr. Keeble at the inaugural meeting of the Chamber of Horticulture on 2nd December last. He said :—

"I would like to give you two sets of figures which show that horticulturists know how to effect land settlement. Ten years ago there was a mixed arable farm of 130 acres in one of the Midland counties of England, and at that time it employed 5 permanent men. That farm has now been converted, as regards 80 acres, into fruit and market gardens, and it now employs 20 permanent men and 150 fruit pickers during the season. A second example, which points the same moral, is from one of our best-known growers who was kind enough to give me his biography. In 1881, the farm to which he refers, 150 acres in extent, was mostly arable, and it was run by 3 men and a boy with extra labour at harvest. The wages were 15*s.* per week per man. It was converted into a market garden, partly flowers and partly fruit. In two years the number of employees rose from 3 men and a boy to from 20–25 men and 80–100 women, and the wages rose to a minimum of 20*s.* The holding at the present time has been increased to just about double, and that land—310 acres—now employs 90 men in the winter and 110 men in the spring and summer, 50 women in the winter and 200 women in the summer. The wages in 1913 were £7,891 ; the wages in 1918 were £10,600, that is, over £34 per acre."

I do not think that there is any need to regard these figures as very exceptional.

The average figure paid for labour on a holding devoted to fruit and vegetables would be from £15–£20 per acre. Where

the forcing of vegetables in winter is undertaken the employment provided is of a more regular character, and, generally speaking, the amount spent in wages per acre is higher.

Rhubarb.—The forcing of rhubarb is, without doubt, the most considerable instance of the particular form of culture to which I refer. It is a speciality of the Leeds district, yet it is not confined to that area. In the height of the season, *i.e.*, February–March, 30 tons per day are despatched to the London markets.

Asparagus, mushrooms and seakale are examples of other vegetables forced on a far larger scale than most people imagine.

Seed Production.—The seed-growing industry is another branch of horticulture, the magnitude of which is not generally appreciated, and its development during the past three or four decades affords, perhaps, the most striking proof of the development of intensive culture generally.

The official figures quoted concerning orchard and small fruits are sufficient indication, without further comment, of their growing importance. My survey of the situation has been anything but complete. No reference has been made to the hop-growing industry, and only casual mention has been made of the area under potatoes, while only a passing hint has been given as to the value of food produced by intensive methods on the 1,400,000 allotments and the holdings of less than an acre with which published statistics do not deal. And yet sufficient has been said, I hope, to convince you of the importance of this great industry and of the right it has earned to encouragement by the State. I believe that an official inquiry on the lines indicated early in this article would show that between 1,500,000 and 2,000,000 acres are devoted to the various branches of horticulture, and that the annual value of the produce could not be calculated at less than £40,000,000, on a pre-war basis.

SUGGESTIONS AS TO STATE ASSISTANCE.

The question arises as to whether it is desirable, from the point of view of national interest, for the State to foster and encourage this great industry, and if so, what are the obstacles standing in the way of further development, how may they be best overcome, and on what lines should development be encouraged, and exactly in what form should State assistance be given. Does the future of intensive culture lie with the big

concern, fully equipped with the most up-to-date plant and machinery, conducting its operations on a scale sufficiently large to ensure the cost of production and distribution being kept at the lowest figures consistent with efficiency—employing a relatively small but highly-paid staff, and generally run on modern business lines ? Or is the desideratum to be aimed at the creation of a huge number of small holdings, run on co-operative lines by men who are either tenants of the State or occupying owners ?

A glance at the subjoined figures giving the value (roughly 14½ millions sterling) of fruit and vegetables imported in 1913 (the last statistical pre-war year) from foreign countries and the Colonies, and a review of our experience during the past four years will be sufficient to make any thinking man hesitate before hazarding the view that the limit of useful intensive culture has been reached.

IMPORTS FROM FOREIGN COUNTRIES AND THE COLONIES (1913).

Subject to Duty on importation—			
Fruits, canned or bottled, in thin syrup with not more than 12 per cent. added sugar	349,886	cwt.	£ 542,912
Fruits, canned or bottled, other than above	70,766	,,	131,269
Fruit pulp, preserved in thin syrup	167	,,	597
Fruit pulp, preserved in thick syrup	115	,,	584
Marmalade, jams, or fruit jellies	1,381	,,	3,701
Free of Duty—			
Cider and perry	162,150	gal.	5,843
Vegetables, dried	5,616	,,	11,824
,, preserved by canning (unsweetened)	488,889	,,	501,225
Vegetables (raw)—			
Onions	9,105,164	bush.	1,035,053
Potatoes	9,427,316	cwt.	2,589,038
Tomatoes	1,582,986	,,	1,348,682
Unenumerated	—		519,340
Flowers—			
Artificial	—		832,417
Fresh	—		288,728
Fruit (raw)—			
Apples	3,257,419	cwt.	2,230,370
Apricots and peaches	9,512	,,	30,813
Cherries	62,267	,,	123,230
Gooseberries	8,086	,,	6,700
Grapes	582,537	,,	740,543
Pears	718,928	,,	650,084
Plums	409,877	,,	437,306
Strawberries	15,040	,,	25,645
Unenumerated	355,195	,,	325,101
Fruit, preserved without sugar—			
Canned or bottled	207,411	,,	203,640
Other than canned or bottled	263,095	,,	115,926
Honey	31,815	,,	50,673
Hops	262,184	,,	1,753,003
			£14,504,247

HINDRANCES TO DEVELOPMENT.

It is only fair to admit, however, that there are considerable obstacles in the way of further development. During the War agriculturists have, not only in this country, but in most countries, been trading on the reserves of fertility stored up in the soil in happier days, and, unless those reserves are made good, production will not increase but diminish. The situation with regard to fertilisers is undoubtedly serious. You cannot, in my judgment, have any large development of intensive culture on commercial lines without an abundant supply of organic fertilisers and stable manure.

For certain forms of intensive culture " seasonal labour " is indispensable, but the difficulty of obtaining this is likely to increase unless side by side with future development there is a revival of subsidiary village industries.

An increased area devoted to intensive culture would involve an increased liability to diseases, for many of which science has so far failed to discover any effective remedy.

The machinery for the distribution of perishable produce falls very far short of complete efficiency, and this fact also militates against any large increase in its production. The very heavy risks involved in any system of intensive cultivation, owing to the vagaries of our climate, which may result in a glut or a complete failure of crop, will continue to make many people hesitate before embarking on the enterprise.

Then, too, the fiscal policy of the Government, whatever it may prove to be, is bound to be a controlling factor in the development of culture on intensive lines. With the increasing cost of production, a reversion to pre-war sale prices would not only arrest development, but would probably result in a serious diminution in the practice of intensive culture. It is true that foreign supplies encourage the habit of eating fruit and vegetables all the year round, and we have the benefit of this as soon as our own supplies are ready. I am aware also that English retailers of fruits and vegetables depend very largely during certain months of the year upon foreign supplies for their livelihood, and that, if these were entirely cut off, within a very short time a large percentage of the distributing agencies upon which the English grower depends for the disposal of his produce would be closed down. But that does not alter the fact that the English grower will not be able to stand the risk of glut or crop failure and ever-increasing wages,

fertilisers and machinery bills, unless the general average of sale prices in the future is a good deal higher than that ruling in pre-war days.

The increasing tendency of landowners to refuse to let land for market-gardening purposes is of course a serious hindrance to development on intensive lines. Another hindrance is our present system of rating whereby a man's liability for rates is increased in proportion to the improvements he has effected on the land he cultivates.

No great development of intensive culture is possible until the problem of rural housing has been solved. Insecurity of tenure, inadequate compensation for continuous manuring and high cultivation and high railway rates, with unfair classification, are other deterrents to that full development of intensive culture which we would all wish to see. What can be done to assist development? I have no hesitation in saying that very much can be done—by the growers themselves, and also by the Government.

HOW GROWERS CAN HELP THEMSELVES.

A thorough organisation of the industry—on lines adopted by other great enterprises—is one of the most urgent needs of the moment. It can be effected only by the growers themselves.

The adoption of standard weights and packages, and standard methods of packing and grading, would be an immense boon to the trade generally and would increase very materially, I believe, the demand for home-grown produce.

Buying and marketing on co-operative lines would, in the case of all but the largest growers, effect a considerable reduction in the cost of production and an increase in the price realised for goods produced.

A more enlightened attitude on the part of growers generally towards those engaged in scientific research work is greatly to be desired. Without the whole-hearted co-operation of practical men, scientists are too heavily handicapped to be able to accomplish much really useful work, and as time goes on it will, I am convinced, become more and more evident that the practical man is also heavily handicapped without the assistance of the man of science.

There is room also for a vigorous propaganda in the public Press and elsewhere as to the dietetic value of fruit and

vegetables and as to the best methods of preparing them for the table. Few people, comparatively, realise fully the value of fruit and vegetables as a source of human food, and fewer still know how to cook them. The War has taught the public a good deal in this direction, but there is still room for improvement, and it is safe to say that, if the health-giving properties of these commodities were once generally appreciated, home growers would have all their work cut out to meet the demand for them.

If the difficulties confronting the industry are to be successfully met, growers will have to become less individualistic. They will have to develop a willingness to pool their knowledge and experience—we shall have to realise as perhaps few of us have realised before, that to assist a fellow grower to improve the quality of his produce, to pack and grade it better, and to distribute it in the quarters where it is most needed will, in the long run, be doing a good turn to the trade generally, for nothing so quickly affects the demand for home-grown produce as poor quality goods, or even good quality goods improperly packed and imperfectly graded.

Growers should endeavour to find out what crops their soil is best suited for, and to grow those crops only. The attempt to produce crops that the soil is not naturally adapted for results in loss to the individual grower and injury to the trade generally, and it is to everyone's interest to prevent it if possible. A fully-organised industry will be in a position to enable its members to steer clear of many mistakes which have been all too common in the past.

STATE GRANTS IN AID.

The State can in the first instance assist the further development of the industry by putting an end, as soon as may be, to the system of control whereby the grower bears unaided any losses he suffers, but is obliged to share with the public any profits which accrue.

Further, we want from the State something a little more invigorating than platonic sympathy. The September, 1918, issue of the *Journal of the Board of Agriculture* gives a statement as to Grants in Aid of Agricultural Research for the Financial Year ending 31st March, 1919.* The total amounts to the munificent sum of £20,450.

The business of scientific research and the control and eradication of pests and diseases need tackling in real earnest

* See page 715.

if the State really desires that English horticulture shall hold its own. The country should be divided into provinces consisting of groups of counties—each province should have its fully-equipped and staffed research station, and each county should have its demonstration station, and, further, representative growers in each county should be asked to carry out experiments at the cost of the State and under the supervision of those in charge of the provincial research station—such experiments to be open to the inspection of all the growers in the locality.

No time should be lost by the Government in fully exploring the possibilities of increasing production and checking disease by electrical discharges upon the soil and of cheapening many cultural operations by the provision of electric power at a reasonable price.

It should be the aim of the State to show how costs of production can be reduced though wages are more than doubled. The giving effect to many recommendations of the Agricultural Policy Sub-Committee of the Reconstruction Committee would be equally beneficial to horticulture as to agriculture, expecially the recommendation of the adoption of the "Evesham Custom" with regard to holdings let for market-garden purposes. The adoption of this custom provides what I believe to be the only practical and equitable way out of a very real difficulty, and under it the interest of both landlord and tenant seem adequately safeguarded.

The establishment of State pulping stations and drying plants in suitable districts would be beneficial and ought not to involve any permanent charge upon the Exchequer.

The policy inaugurated by Lord Ernle of appointing committees consisting of men with practical knowledge to act in an advisory capacity to the Board's Horticultural Department should be continued—nothing but good can result from conferences between the powers that be and the men that know.

Improved transport is one of the few things definitely promised to us. Is it too much to hope that transport facilities will be both cheapened and increased?

The last Government aid which I will suggest is the remodelling of the rating system on principles more consistent with commonsense and equity than those upon which the existing system is based.

COMPARISON OF LARGE AND SMALL HOLDINGS.

In conclusion, does the future lie with the large and well-equipped holding or with the small holdings run on co-operative lines? In the main I am inclined to think that it rests with the former. Small holders, even though working on co-operative lines, will find it increasingly difficult to compete with the produce of the large and well-equipped holding. Expenses, however much the co-operative spirit may develop, must be higher all round on the small holding. The output per acre is not necessarily greater on a small than on a large holding. Moreover, you cannot, with any prospect of success, force the creation of small holdings; where land and conditions are suitable small holdings will be established without adventitious aid—as is demonstrated in the Evesham district. I am a whole-hearted believer in allotments; the more the better for the food supplies of the country and for the health of those who cultivate them. I may be wrong in my view of the prospects of the horticultural small holder, and if the small holder can be induced to work on co-operative lines there is possibly a much greater future before him than I imagine. There are strong sentimental reasons in favour of small holdings, but I think most Englishmen need more material advantages to satisfy them for any length of time. I agree that every facility should be afforded to returning soldiers to settle on the land if they express a keen desire to do so, but I hope they will not be encouraged to invest their savings in small holdings until they have been afforded a real opportunity of finding out whether they really like the life, and of satisfying themselves that the prospects are really as good as represented.

SOME FURTHER INVESTIGATIONS ON THE FOOD OF WILD BIRDS.*

WALTER E. COLLINGE, D.Sc., F.L.S.,
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I.—INTRODUCTION.

THE writer has now been able to complete the examination of the stomach, etc., contents of a further eight species of wild birds, estimating the food contents by the volumetric method.

Hitherto considerable controversy has taken place with reference to most of these species, and as a result of the investigation recently completed it is now possible definitely to state the percentages of the different kinds of food eaten by each species, so that the injuries and benefits can at once be seen and their relationship to agriculture and fruit growing appreciated.

The total number of adult specimens examined is 798, obtained, with one exception, during each month of the year, and 166 nestlings.

With reference to the 17 species described in this and a previous article (4) definite standards are now proposed respecting their food and feeding habits, and the result of any future investigations on these species, in so far as they differ from these standards, will at once serve to show any change that has taken place in such habits in the intervening period. It need scarcely be pointed out that it is of considerable importance at any future date to bear in mind the question of whether the particular species studied has increased or decreased in numbers. Such information is often difficult to obtain, but a fairly correct approximation can, with a little trouble, be arrived at. Moreover, it is incumbent upon an investigator to endeavour to interpret and explain all such results in order that his work may economically be of practical value.

If, as the result of a large increase in numbers, a bird becomes injurious, due to an insufficiency of its natural food, and a consequent change of its feeding habits, then temporary repressive measures are desirable, firstly, in order to protect the crops, etc., from destruction, and secondly, in order quickly to arrest the change in its feeding habits and thereby secure the full benefit it normally confers.

It must ever be borne in mind that any estimate of a bird's economic status cannot be regarded as a fixed decision. Such

* A previous article on this subject was published in this *Journal*, September, 1918, p. 668. See reference No. 4 of Bibliography on p. 1461.

an estimate may hold good in some cases for a considerable length of time, but in other cases changes in the number of individuals, or in the environmental conditions, either locally or generally, may quickly bring about changes in the feeding habits: hence the necessity for continued investigation, and the provision for revision, at stated periods, of any repressive or protective measures enacted by the Law.

II.—SPECIMENS EXAMINED.

1. JACKDAW (*Corvus monedula*, Linn.).

The Jackdaw undoubtedly has a bad name, and those interested in the preservation of game have not been slow to magnify its delinquencies. Still it will not do to consider the economic position of this bird from that standpoint; such an attitude would manifestly be unfair, and fatal to quite a large number of species. Judgment must be based upon the sum total of its activities.

Lord Lilford (6) has drawn attention to the damage done by this bird "to chickens, pheasants and partridges, also to green peas and other vegetables." He adds, "in several instances to our knowledge they took possession of the owls' nests, destroyed their eggs, and piled up their nests in the cavities."

A Warwickshire correspondent writes, "Though I have no such evidence myself as regards barn owls, I have a very clear case regarding pigeons. I had a dovecote, one of the old-fashioned ones on a pole. In it some 20 to 30 pigeons were nesting one spring some years ago. One day I found all the pigeons sitting disconsolately on the barn, and a pair of Jacks strutting about the dovecote, having driven all the pigeons off their nests, and undoubtedly eaten their eggs and young. I shot the Jacks and the pigeons at once went back, and re-commenced their nesting operations."

These are undoubtedly serious charges, and very apt to prejudice views with reference to this bird, but it must be borne in mind that the majority of Jackdaws do not prey upon barn owls, pigeons, or game-birds. Are these not rather isolated and exceptional cases due to the presence of too many birds in a given area, and, in consequence, to a scarcity of food or to sheer depravity on the part of a few birds only? The writer does not for a moment wish to minimize these depredations, but as a long and keen observer of this bird, and a poultry keeper as well, he has never personally seen or known of such cases.

Post-mortem Records.—The stomach contents of 48 specimens have been examined. Of the total food consumed during the year, 71·5 per cent. is animal food and 28·5 per cent. vegetable food. Of the former 39·5 per cent. consists of injurious insects, 2·5 per cent. of beneficial insects, 8·5 per cent. of neutral insects, 4.5 per cent. of slugs and snails, 3.5 per cent. of earthworms, 2·0 per cent. remains of eggs, 2·0 per cent. remains of

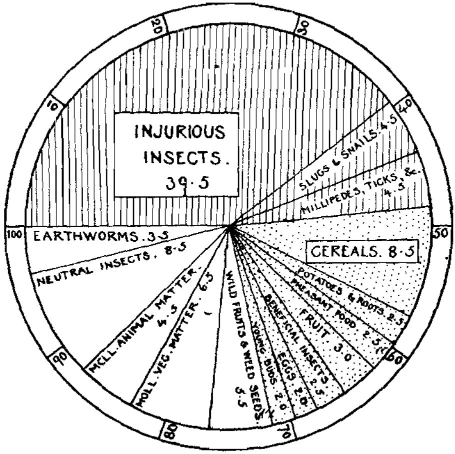

FIG. 1.—Diagrammatic Representation of the Percentages of Food of the Jackdaw.

young birds, and 9·0 per cent. of miscellaneous animal matter (spiders, millipedes, ticks, woodlice, young frogs and mice).

Amongst the injurious insects the following were identified: Larvæ of the Cockchafer (*Melolontha vulgaris*, Fabr.), the May Bug (*Phyllopertha horticola*, Linn.), the June Bug (*Rhizotrogus solstitialis*, Linn.), the Black Vine Weevil (*Otiorhynchus sulcatus*, Fabr.), larvæ (wireworms) and beetles of *Agriotes lineatus*, Linn. and *Sitones* sp., larvæ of the Winter Moth (*Cheimatobia brumata*, Linn.), the Mottled Umber Moth (*Hybernia defoliaria*, Linn.), the Cabbage Moth (*Mamestra brassicæ*, Linn.), and the Turnip Dart Moth (*Agrotis segetum*, Schiff.).

Of the vegetable food 8·5 per cent. consists of cereals, 2·5 per cent. of potatoes and roots, 2·5 per cent. of pheasant and fowl food, 3·0 per cent. of fruit, 5·5 per cent. of fruits and seeds of weeds, and 6·5 per cent. of miscellaneous vegetable matter (grass and leaves not identifiable (Fig. 1*).

A summary of these items shows that, of the total food consumed, 48·5 per cent. is beneficial*, 28·5 per cent. neutral, and 23·0 per cent. injurious. The miscellaneous animal matter has been regarded as half beneficial and half neutral.

Conclusion.—In spite of the bad name that has been given to the Jackdaw, the actual injuries occasioned by it are comparatively small, whilst nearly half of its food consists of injurious insects, etc. There may be cases where it is too plentiful or too numerous in a district, but frequently its destruction is quite unnecessary. On the whole the good it does far outweighs the harm, and to condemn it for its misdeeds, as many writers have done, and to lose sight of the benefits it confers, is a very short sighted and mistaken policy.

2. STARLING (*Sturnus vulgaris*, Linn.)

In considering the economic position of the Starling three facts must be borne in mind, viz., (i.) during the past 15 or 16 years this species has enormously increased throughout the whole of the country. It is unnecessary here to adduce the evidence in support of this statement, but it is ample and overwhelming; (ii.) we have equally satisfactory evidence to show that in other countries where this bird has become abnormally abundant, it has become injurious; (iii.) quite a number of careful and competent observers have contended that owing to this increase the Starling has changed its feeding habits.

Where a species of wild bird becomes unusually abundant the conditions (ii.) and (iii.) invariably follow and, therefore, at the present time the economic status of this bird deserves more than ordinary attention.

There are also two further points that must not be overlooked, viz., the gregarious nature of the Starling, and the charges that have been brought against it of destroying or usurping the nests of other birds. In the case of the Starling, which exhibits both grain-eating and fruit-eating propensities, the habit of collecting in enormous flocks is one that presents a great element of danger, for these large assemblies may in a remarkably short

* In all the figures the portions shaded by longitudinal lines represent food that it is beneficial the birds should eat; those stippled, food that it is injurious they should eat; and the blank portions food of a neutral nature.

space of time completely ruin a crop. On the other hand, it is only fair to point out that they prove of great benefit in the case of an attack of an injurious insect, such, for instance, as that in Bavaria in 1889–91 of the Spruce or Nun Moth, when flocks containing as many as 10,000 birds were seen feeding upon the larvæ and pupæ of this moth. With regard to the charges of occupying the nests of other birds, the evidence as yet is far from satisfactory: the writer has no personal knowledge of any such cases.

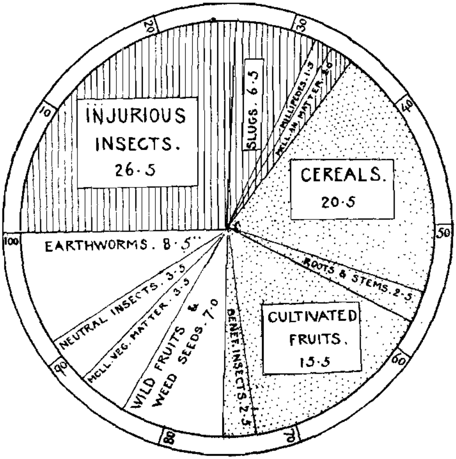

FIG. 2.—Diagrammatic Representation of the Percentages of Food of the Starling.

Since 1913 the whole of the records for this species have been most carefully considered and a further series of stomach contents examined. The results obtained from these appear to enable us more accurately to form an opinion in connection with a species that has, certainly of recent years, been most perplexing.

Post-mortem Records. — As a result of the examination of 368 adults it was found that of the total food consumed in a year 51 per cent. consists of animal food and 49 per cent. of vegetable food. Of the former 26·5 per cent. is composed of

injurious insects, 2·5 per cent. of beneficial insects, 3·5 per cent. of neutral insects, 8·5 per cent. of earthworms, 6·5 per cent. of slugs, 1·5 per cent. of millipedes, and 2·0 per cent. of miscellaneous animal matter. The consumption of animal food is largest in April, May and June, the percentages in these months being 56, 96, and 97 respectively. Of the vegetable content 20·5 per cent. consists of cereals, 2·5 per cent. of roots and leaves, 15·5 per cent. of cultivated fruits, 7·0 per cent. of wild fruits and seeds of weeds, and 3·5 per cent. of miscellaneous vegetable matter (grass, bread, rice, etc.) (Fig. 2.).

Summarising these figures it is shown that 36·5 per cent. of the food is beneficial, 22·5 per cent. of a neutral nature, and 41·0 per cent. injurious.

As the Starling has been stated to be more injurious than the Rook, it will be interesting to compare the percentages of the different food items of the two species.

Table showing Percentages of Various Foods eaten by the Rook and Starling.

—	Rook.	Starling.
Cereals	35·1	20·5
Potatoes and roots	13·4	2·5
Cultivated fruits	—	15·5
Wild fruits and seeds of weeds	4·4	7·0
Miscellaneous vegetable matter	6·1	3·5
Injurious insects	23·9	26·5
Beneficial insects	3·5	2·5
Neutral insects	4·6	3·5
Earthworms	4·4	8·5
Slugs, snails, and millipedes	3·2	8·0
Miscellaneous animal matter	1·4	2·0
Total animal food	41·0	51·0
Total vegetable food	59·0	49·0
Benefits	28·5	36·5
Injuries	52·0	41·0
Neutral	19·5	22·5

A careful comparison and consideration of the above figures shows that while the Starling consumes a considerable percentage of cereals and cultivated fruits, it also eats more injurious insects and less beneficial ones than the Rook. It also takes a greater percentage of slugs and snails, and while its injuries at present far outweigh the benefits it confers, they are not so great as those of the Rook.

Food of Nestlings. — The food of 40 nestlings has been estimated by the volumetric method and the following results

obtained: 89·0 per cent. consists of injurious insects, 1·5 per cent. of neutral insects, 6·5 per cent. of earthworms and slugs, and 3·0 per cent. of vegetable matter. The contents of 94 stomachs of nestlings (²) have previously been set forth numerically.

Conclusion. — There can no longer be any doubt as to the economic position which this species occupies. It has increased to such an extent that it has been forced to change its feeding habits. Many years ago Aplin (⁵) pointed out that the enormous increase of the Starling had led to a change of feeding habits in the Rook; much of the animal and vegetable food that the Rook formerly lived on was taken by the Starling. Even that supply would now seem to be insufficient, and so, like the Rook, the Starling has gradually been forced to supplement its diet by cereals and fruit. This is undoubtedly a case which calls for carefully considered repressive measures. Farmers and fruit-growers have long been alive to the serious nature of the depredations inflicted by this bird, and have repeatedly called for some action. If it were considerably reduced in numbers this species would economically prove a most useful and valuable bird, whereas at present it must be classed as an injurious one.

3. CHAFFINCH (*Fringella cœlebs*, Linn.).

Opinion is very divided as to the economic position this species occupies. As Slater (⁷) has pointed out, "Its delinquencies are so open and apparent that they may outweigh in popular estimation the great good it does." The same writer also remarks that it probably bears blame for the damage done to sown seeds by the Greenfinch, with which statement the writer fully agrees.

In a recent investigation made by Theobald and McGowan (⁸), where the stomach contents were estimated by the numerical method, the authors state, "It is extremely difficult to form any judgment regarding the economic status of the Chaffinch, but from the food contents found the writers are inclined to look upon it as neutral."

An analysis of the stomach contents of 128 adults and 32 nestlings estimated by the volumetric method enables us to form a rather more definite judgment.

Post-mortem Records. — Of the total food consumed in the year 25 per cent. is animal food and 75 per cent. vegetable food. Of the former 16·5 per cent. consists of injurious insects, 1·5 per cent. of beneficial insects, 4·5 per cent. of neutral

insects, 1·0 per cent. of spiders, and 1·5 per cent. of earthworms. The bulk of the vegetable food, viz, 56 per cent., consists of weed seeds, 4·5 per cent. of blossom buds, 3·5 per cent. of fruit pulp, 8·5 per cent. of cereals, and 2·5 per cent. of miscellaneous vegetable matter (Fig. 3).

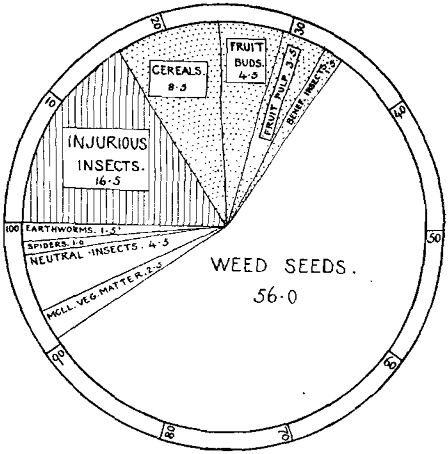

FIG. 3.—Diagrammatic Representation of the Percentages of Food of the Chaffinch.

A summary of these figures shows that 65·5 per cent. of the food is of a neutral nature, 18·0 per cent. beneficial, and 16·5 per cent. injurious.

Food of Nestlings. — The whole of the food content of the 32 nestlings was of an animal nature, 98 per cent. consisting of injurious insects (aphids, larvæ of the Winter Moth (*Cheimatobia brumata*, Linn.), small Geometrid larvæ, the Apple Blossom Weevil (*Anthonomus pomorum*, Linn.), and other coleopterous larvæ), 1·0 per cent. of beneficial insects, and 1·0 per cent. of neutral insects.

Conclusion. — This species is by no means so plentiful as it was five or six years ago and, whilst not advocating any special protection for it, the writer thinks that both the farmer and the fruit-grower would be the sufferers if it were destroyed in any

great numbers, for its activities as a destroyer of injurious insects must be of great value and fully, or more than compensate for, the injuries it inflicts; the bulk of its food, however, is of a neutral nature.

4. YELLOW BUNTING (*Emberiza citrinella*, Linn.).

An investigation of the feeding habits of this species made in 1909 ([3]) showed that, in districts where it was plentiful, a certain amount of damage was done to cereals, but apart from this it was regarded as a beneficial species. Since that date the Yellow Bunting has considerably increased, and the charges

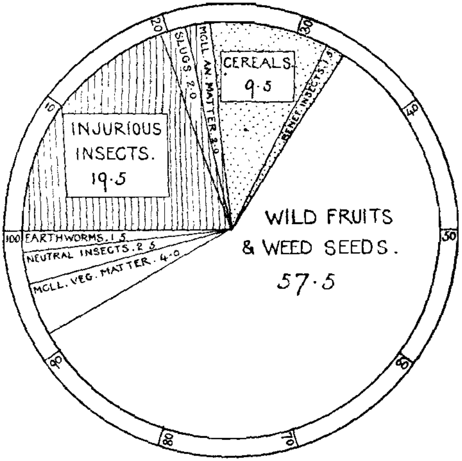

FIG. 4.—*Diagrammatic Representation of the Percentages of Food of the Yellow Bunting.*

of damage to cereals have been repeated. It was, therefore, thought advisable to include it in the series of species investigated during 1918.

Post-mortem Records.—Fifty-eight adults and 17 nestlings have been examined. Of the total food consumed in the year 29 per cent. was animal food and 71 per cent. vegetable food. Of the former 19·5 per cent. consists of injurious insects, 1·5 per cent. of beneficial insects, 2·5 per cent. of neutral insects,

2·0 per cent. of slugs, 1·5 per cent. of earthworms, and 2·0 per cent. of miscellaneous animal matter (millipedes, etc.) The bulk of the vegetable food consists of wild fruits and the seeds of weeds, this item alone accounting for 57·5 per cent., 4·0 per cent. of miscellaneous vegetable matter (leaves and grass), and 9·5 per cent. of cereals (Fig. 4). Particular attention has been given to this last item and the percentages kept for each month of the year. These are shown below :—

Table showing the Percentage of Cereals eaten by the Yellow Bunting in each Month of the Year.

Month.	*Cereals.*
January	5·5 per cent.
February	5·5 ,,
March	5·5 ,,
April	3·0 ,,
May	3·0 ,,
June	1·0 ,,
July	1·0 ,,
August	26·5 ,,
September	36·0 ,,
October	22·0 ,,
November	3·0 ,,
December	2·0 ,,
Total average	9·5 per cent.

These figures are interesting, for, excluding the months of August, September and October, they show that the average amount of cereals eaten in the year is only 2·46 per cent., from which it may be concluded that the bulk of cereals eaten by this bird is obtained from the stubbles and the stackyard

Thus summarised the record shows 23·5 per cent. of the food as being beneficial, 65·5 per cent. neutral, and 11·0 per cent. injurious.

Food of Nestlings. — The whole of the stomach contents consisted of animal food, of which 99·0 per cent. was injurious insects, and 1·0 per cent. neutral insects.

Conclusion. — There are undoubtedly districts where this bird from time to time becomes fairly numerous, and it then damages cereals to a slight extent, but generally speaking its activities are beneficial.

5. GREAT TIT (*Parus major*, Linn., sub.-sp. *newtoni*, Praz.).

The misdeeds of both this species and the Blue Tit have been grossly exaggerated by fruit-growers, gardeners, and

others, whilst previous workers estimating its stomach contents by the numerical method have not helped to re-establish its reputation. If every species of wild bird that during a few months of the year takes a certain toll of cultivated fruit is going to be condemned by the fruit-grower and gardener as one that should be destroyed, without considering what ratio this amount of fruit bears to the rest of its food, then *successful fruit cultivation in this country will* soon be a thing of the past. Were it not for the Tits and similar birds,

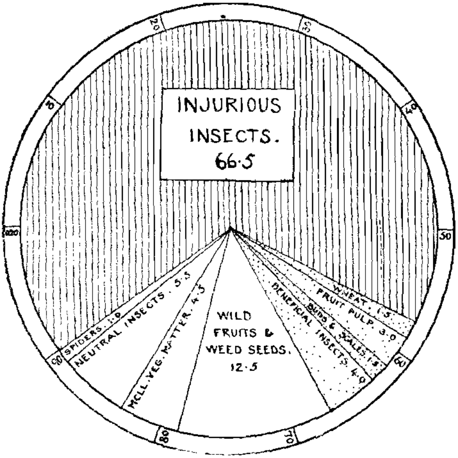

FIG. 5.—Diagrammatic Representation of the Percentages of Food of the Great Tit.

the cultivation of fruit would long ago have proved unprofitable, owing to the innumerable insect pests that attack the majority of fruit trees, and reappear year by year, in spite of spraying and other artificial means of protection.

Post-mortem Records.—The stomach contents of 32 specimens have been examined. Of the total food consumed during the year 77 per cent. consists of animal food and 23 per cent. of vegetable food. Of the former 66·5 per cent. consists of injurious insects, 4·0 per cent. of beneficial insects, 5·5 per cent. of neutral insects, and 1·0 per cent. of spiders. Of the

injurious insects 16·5 per cent. consists of aphids and scale insects, 15·5 per cent. of beetles, 29·0 per cent. of lepidopterous larvæ, and 5·5 per cent. of dipterous larvæ. Clearly identifiable amongst these were the following insects: Apple Leaf Aphis (*Aphis fitchii*, Sanderson), Woolly Aphis (*Schizoneura lanigera*, Hausm.), Apple Sucker (*Psylla mali*, Förster), Mussel Scale (*Lepidosaphes ulmi*, Linn.), Brown Currant Scale (*Lecanium persicæ*, var. *coryli*, Linn.), Apple Blossom Weevil (*Anthonomous pomorum*, Linn.), numerous fragments of weevils and Scolytidæ; the larvæ of the Winter Moth (*Cheimatobia brumata*, Linn.), Mottled Umber Moth (*Hybernia defoliaria*, Linn.), Codling Moth (*Carpocapsa pomonella*, Linn.), various Tortrices and Noctuidæ, Crane Flies, and numerous dipterous larvæ.

More than half, viz. 12·5 per cent., of the 23 per cent. of vegetable food consists of the fruits and seeds of weeds, 3·0 per cent. of fruit pulp, 1·5 per cent. of blossom buds, 1·5 per cent. of wheat, and 4·5 per cent. of miscellaneous vegetable matter (Fig. 5).

A summary of the above figures shows that 66·5 per cent. of the total food consumed is beneficial, 23·5 per cent. neutral, and 10 per cent. injurious.

Conclusion. — As a destroyer of injurious insects this bird must be reckoned as one of the most valuable we have, for in the case of many purely insectivorous birds many of the species of insects eaten are of a neutral nature and a fair percentage beneficial ones; here, however, 66.5 per cent. is injurious, and only 4·0 per cent. beneficial, and 5·5 per cent neutral. Even admitting that the Great Tit damages much fruit which it does not eat, one cannot ignore the fact that whilst a hundred Tits in an orchard may commit an appreciable amount of damage to the fruit, it is extremely doubtful if there would have been any fruit to damage had it not been for their good services earlier in the season.

6. BLUE TIT (*Parus cæruleus*, Linn., sub.-sp. *obscurus*, Praz.).

This active, inquisitive little bird has, like its relative the Great Tit, been much maligned by fruit-growers and others. Long ago Yarrell (9) pointed out, " They see it busily at work on a fruit-tree, bud after bud coming under its scrutiny, while the protective covering of each drops on the ground and shows the destruction done. Content with such imperfect evidence, they go their way vowing vengeance on the Bluecap, and when

they get the chance are mostly as good as their word. . . . Yet none can be more mistaken than these men."

Post-mortem Records.—The stomach contents of 50 adults and 39 nestlings have been examined. Of the total food consumed during the year, 79 per cent. is animal food and 21 per cent. vegetable food. Of the former 78·0 per cent. consists of injurious insects, viz. 4·0 per cent. of aphids, 8·5 per cent. of scale insects, 18·5 per cent. of beetles, 23·5 per cent. of lepidopterous larvæ, and 23·5 per cent. of dipterous and hymenop-

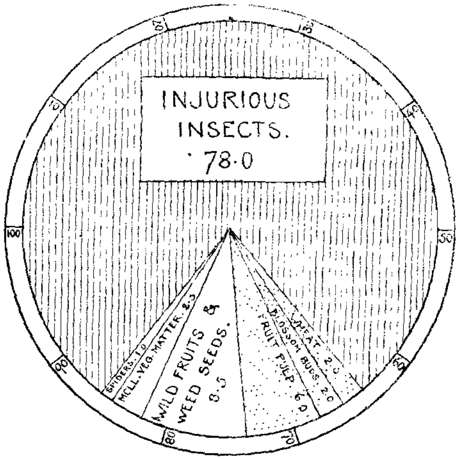

FIG. 6.—Diagrammatic Representation of the Percentages of Food of the Blue Tit.

terous flies and larvæ. The remaining 1·0 per cent. of animal food consists of spiders. Of the vegetable food 8·5 per cent. consists of wild fruit and seeds of weeds, 2·5 per cent. of grass and miscellaneous vegetable matter, 6·0 per cent. of fruit pulp, 2·0 per cent. of blossom buds, and 2·0 per cent. of wheat (Fig. 6).

Thus of the total food consumed in a year 78·0 per cent. is beneficial, 12·0 per cent. neutral, and 10·0 per cent. injurious.

Conclusion.—It is sincerely to be hoped that the volumetric analysis given above will lead fruit-growers and gardeners to

realise more clearly the position this bird occupies. The sum total of its activities is distinctly beneficial, and all who foster or aid in its destruction are doing a serious injury both to themselves and fruit-growers in general.

7. SONG THRUSH (*Turdus musicus*, Linn.)

Whilst the food-habits of this species are very similar to those of the Missel Thrush, its liking for fruit is by no means so pronounced.

Post-mortem Records. — The stomach contents of 84 adults and 38 nestlings have been examined. Of the total food con-

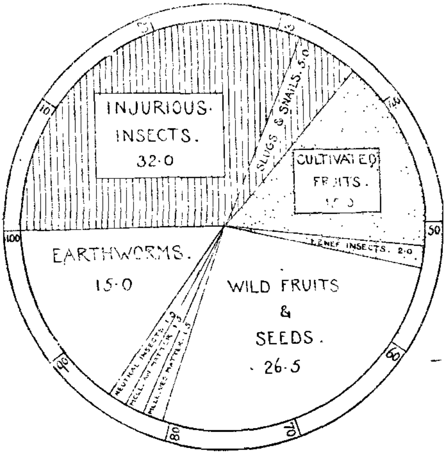

FIG. 7.—Diagrammatic Representation of the Percentages of Food of the Song Thrush.

sumed during the year, animal food constitutes 57 per cent. and vegetable food 43 per cent. Of the former 32·0 per cent. consists of injurious insects, 2·0 per cent. of beneficial insects, and 1·5 per cent. of neutral insects. Of the injurious insects 24·5 per cent. were beetles and beetle larvæ, 4·0 per cent. of lepidopterous larvæ, 2·5 per cent. of leather-jackets, crane flies and eggs of crane flies, and 1·0 per cent. of miscellaneous insects. Earthworms constitute 15·0 per cent. of the diet,

the percentage reaching 22·5 in May and 19·0 in June; slugs and snails represent 5·0 per cent., and miscellaneous animal matter 1·5 per cent.

Of the 43 per cent. of vegetable matter, wild fruits and seeds were present to the extent of 26·5 per cent., and cultivated fruits 15·0 per cent., the remaining 1·5 per cent. being miscellaneous vegetable matter (grass, bread, etc.) (Fig. 7).

Summarising these figures it is found that 37·0 per cent. of the total food consumed during a whole year is beneficial, 46·0 per cent. neutral, and 17·0 per cent. injurious.

Food of Nestlings.—The food of the nestlings is almost wholly of a beneficial nature; 90·5 per cent. consists of injurious insects, 2·0 per cent. of beneficial insects, and 3·5 per cent. of neutral insects. Only 3·0 per cent. consists of earthworms and slugs, and 1·0 per cent. of vegetable matter. Amongst the animal food were large quantities of fragments of weevils, 38 lepidopterous larvæ, 4 larvæ of Noctuid moths, 5 wireworms, 9 dipterous larvæ, 4 spiders, and remains of earthworms and slugs.

Conclusion.— That the Song Thrush during a comparatively short period of the year does considerable damage to certain cultivated fruits there can be no denying, but the injuries it occasions are more than fully compensated for by the benefits it confers during the remainder of the year. Except in southern localities where, like the Missel Thrush, this species occasionally becomes too numerous, its food record is all in its favour, and fruit-growers generally will be well advised and acting in their own interests if they leave this bird alone.

8. FIELDFARE (*Turdus pilaris*, Linn.).

This handsome autumn visitor has from time to time been reported to the writer as damaging fruit, but no trace of such has ever been found amongst the stomach contents. Archibald (¹) states that "In very hard weather it has been known to do some damage to turnips," but before convicting it on this score it is important to know that these were not roots fed to sheep.

Post-mortem Records.—Of 30 specimens examined between September and May, the total animal food formed 59 per cent. and the total vegetable food 41 per cent. The various items were as follows: 34·5 per cent. consisted of injurious insects, viz., 28·5 per cent. of beetles and beetle larvæ, 4·5 per cent. of dipterous larvæ, and 1·5 per cent. of lepidopterous larvæ; 2·0 per cent. of neutral insects, and 1·0 per cent. of beneficial

insects. Earthworms were present to the extent of 14·5 per cent., slugs to 4·5 per cent., and spiders, millipedes, woodlice, etc., 2·5 per cent. Of the vegetable food 36·0 per cent. consists of wild fruits and weed seeds, 2·0 per cent. of grass, and 3·0 per cent. of miscellaneous vegetable matter not identifiable (Fig. 8).

Of the food consumed by this species during its residence in this country, therefore, 41·5 per cent. is beneficial, 57·5 per cent. neutral, and only 1·0 per cent. injurious.

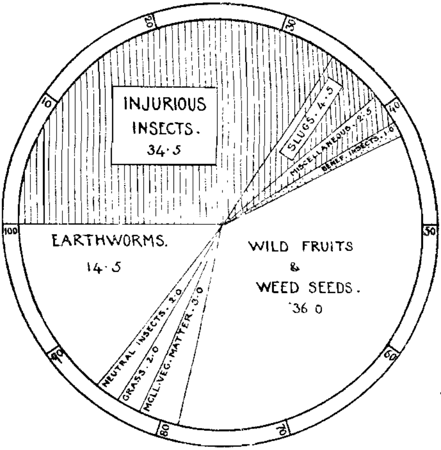

FIG. 8.—Diagrammatic Representation of the Percentages of Food of the Fieldfare.

Conclusion. — So far as its present record is concerned, this is a most valuable bird to the farmer, and certainly merits every protection during its stay in this country.

GENERAL CONCLUSION AND SUMMARY.

The contention that birds as a class are beneficial is well illustrated by summarising the food percentages of the 16 species which have been treated of in this and a former paper (4). The House Sparrow is omitted, as only two records

have been obtained of the percentages of food. This list includes a typical series of our commoner wild birds, and shows that the benefits they confer are more than twice as great as the injuries they inflict.

Table showing (1) *Beneficial,* (2) *Injurious, and* (3) *Neutral Food Eaten by each Species.*

Species.	Benefits.	Injuries.	Neutral.
1. Jackdaw	48·5	23·0	28·5
2. Rook	28·5	52·0	19·5
3. Starling	36·5	41·0	22·5
4. Chaffinch	18·0	16·5	65·5
5. Yellow Bunting	23·5	11·0	65·5
6. Skylark	36·5	13·0	50·5
7. Great Tit	66·5	10·0	23·5
8. Blue Tit	78·0	10·0	12·0
9. Missel Thrush	35·5	21·0	43·5
10. Song Thrush	37·0	17·0	46·0
11. Fieldfare	41·5	1·0	57·5
12. Green Woodpecker	100·0	—	—
13. Sparrow Hawk	45·0	47·0	8·0
14. Kestrel	89·5	6·0	4·5
15. Lapwing	70·0	—	30·0
16. Wood Pigeon	1·5	62·0	36·5
Averages	47·3	20·6	32·1

These figures may be visually illustrated by a diagram (Fig. 9).

Summary.—After examining the stomach contents of 798 adults and 166 nestlings, embracing eight species of wild birds, the opinion has been formed that :—

1. The Jackdaw, Yellow Bunting, Great Tit, Blue Tit Song Thrush and Fieldfare are distinctly beneficial.
2. The Great Tit, Blue Tit and Fieldfare are beneficial to such an extent that their protection is advisable.
3. In spite of the injuries it commits, it would be unwise to recommend any repressive measures for the Chaffinch.
4. The Starling has been allowed unduly to increase. At the present time it is far too numerous, and the injuries it commits are far greater than the benefits it confers. Temporary repressive measures would, no doubt, help to restore a more normal population of this bird, with considerable benefit to both the farmer and the fruit-grower.

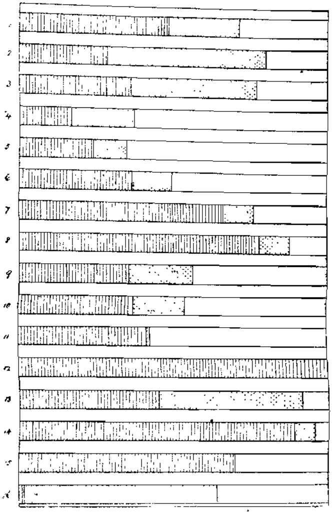

FIG. 9.

1. Jackdaw.
2. Rook.
3. Starling.
4. Chaffinch.
5. Yellow Bunting.
6. Skylark.
7. Great Tit.
8. Blue Tit.
9. Missel Thrush.
10. Song Thrush.
11. Fieldfare.
12. Green Woodpecker.
13. Sparrow Hawk.
14. Kestrel.
15. Lapwing.
16. Wood Pigeon.

FIG. 9.—Diagram showing the comparative benefits, injuries, etc., of the species named. Benefits are marked by the portions shaded by longitudinal lines, injuries by stippling, and the blank portions represent the percentages of food of a neutral nature.

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IMPORTS, EXPORTS, AND SUPPLIES OF AGRICULTURAL PRODUCE OF THE UNITED KINGDOM DURING THE WAR.

WITH SPECIAL REFERENCE TO IMPORTS.

It is now possible, from the "Trade" Returns for the year *1918 recently published by the Board of Trade and from* statistics prepared by the Board of Agriculture and Fisheries, to examine the effect the War has had on the prices and supplies of agricultural produce in the United Kingdom, and also, more particularly, to make comparisons between the two years 1917 and 1918.

The total value of the principal articles of agricultural produce imported into the United Kingdom during the last five years is as follows:—

	£
1918	425,060,000
1917	357,181,000
1916	305,493,000
1915	276,648,000
1914	211,591,000

These figures represent the value (cost, insurance and freight) as declared to the Customs officers at the port of arrival, of the grain and flour, meat and animals for food, butter, cheese, eggs, condensed milk, fruit and vegetables, hops, lard and margarine, which may be grouped together as agricultural

oducts in the sense that they compete more or less directly th the products of the farmers of the United Kingdom.

In spite of the increase in *value* of 19·0 per cent. over the ;ure for 1917, and 100·9 per cent. over that for 1914, the *'antities* imported showed in the case of every article enumer-ed above, a decrease as compared with 1914, and a decrease every article except one (viz., condensed milk) as compared th 1917. In some cases, as will be seen from a study of the veral tables of imports which are given later on in this article, e decrease in the quantities imported has been considerable. ıus, when the comparative values of the different commodities *r unit* are taken, the rise in price per cent. becomes much ;her, and illustrates very forcibly the penalty this country s had to pay for its large dependence on the foreign market : its food supplies. It is noteworthy that in practically ery instance the cost of the imported article has increased ore than that produced in this country. The gradual rise ıich has taken place in the prices of imported agricultural oduce during the years of war is shown in the following ble :—

Average declared Value of Agricultural Produce Imported.

Description.	1918.			1917.			1916.			1915.			1914.			Percentage of Increase since 1914.
	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s*	*d.*	
ef, fresh and frigerated . . cwt.	4	14	8	3	18	5	3	5	4	3	0	1	2	3	1	120
.tton . . ,,	4	8	11	4	1	0	3	14	3	2	18	11	2	3	11	102
rk . . ,,	6	17	8	4	16	10	3	19	8	2	19	1	2	14	10	151
con . . ,,	8	12	7	6	6	1	4	12	6	3	18	0	3	11	6	141
ms . . ,,	8	7	7	6	4	9	4	8	0	3	11	4	3	13	0	130
tter . . ,,	12	10	6	10	9	2	8	14	4	7	0	3	6	0	7	108
eese . . ,,	6	14	11	6	12	1	4	19	5	4	1	6	3	5	6	106
gs gt. hundred*	1	14	10	1	0	7	0	14	4	0	11	11	0	9	8	260
ıeat . . cwt.	0	18	4	0	18	6	0	14	5	0	12	11	0	8	7	114
, flour ,,	1	6	11	1	5	9	0	17	2	0	15	10	0	11	0	145
rley . . ,,	1	1	7	0	19	8	0	13	2	0	9	10	0	7	1	205
ts . . ,,	1	1	0	0	18	4	0	10	6	0	10	10	0	6	7	219
ize . . ,,	0	18	11	0	16	4	0	11	8	0	7	9	0	6	0	215

* A great hundred of eggs is 120.

It should, of course, be borne in mind that the qualities of .e different articles imported may have altered through a ıriety of circumstances brought about by the War. Some ›untries (*e.g.*, Russia) have dropped out of the trade, while

the imports from other countries (*e.g.*, United States) have largely increased.

Meat.—No live cattle, sheep, or pigs for food have been *imported* since 1915. The following are the figures of *home live stock* for the last four years, taken from the Board of Agriculture's returns :—

——	1918.	1917.	1916.	1915.
Cows and heifers in milk or in calf	4,087,762	4,014,132	4,034,382	4,068,957
Heifers in calf	516,079	500,671	464,939	425,793
Other cattle :—				
Two years and above ..	2,289,684	2,338,407	2,344,667	2,221,218
One year and under two	2,747,295	2,757,222	2,801,698	2,665,551
Under one year	2,670,329	2,771,804	2,805,854	2,789,933
Total of cattle ..	12,311,149	12,382,236	12,451,540	12,171,452
Ewes for breeding ..	10,985,361	11,444,673	11,603,904	11,341,904
Other sheep :—				
One year and above ..	4,905,964	5,527,120	5,576,513	5,397,745
Under one year ..	11,171,356	10,895,451	11,669,238	11,536,321
Total of sheep ..	27,062,681	27,867,244	28,849,655	28,275,970
Sows kept for breeding ..	412,065	374,320	434,464	439,290
Other pigs	2,397,150	2,633,596	3,181,427	3,355,841
Total of pigs	2,809,215	3,007,916	3,615,891	3,795,131

Imports of Dead Meat.

Description.	Quantities.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
	Cwt.	Cwt.	Cwt.	£	£	£
Beef, fresh and refrigerated ..	7,697,186	6,125,603	8,844,567	36,422,940	24,029,330	19,060,371
Beef, salted	14,688	44,237	29,841	97,811	219,790	65,262
Mutton ..	2,089,533	2,569,059	5,199,731	9,287,182	10,407,942	11,410,310
Pork ..	99,630	161,427	861,203	685,851	781,530	2,360,722
Pork, salted	11,691	22,750	261,141	77,511	117,816	302,477
Bacon ..	10,477,948	6,567,574	6098,080	90,409,730	41,409,151	18,225,568
Hams ..	1,554,407	1,180,166	838,830	13,025,097	7,360,608	3,063,078
Meat, unenumerated :						
Fresh and refrigerated	690,620	664,822	813,757	3,342,004	2,554,576	1,693,984
Salted ..	2,528	15,502	139,534	14,142	98,064	180,329
Meat, preserved ..	2,188,600	1,900,598	995,211	19,217,438	13,934,760	5,112,191
Rabbits ..	522,542	321,814	505,925	1,216,033	702,876	747,643
Total ..	25,349,367	19,573,554	23,587,820	173,795,739	101,617,443	62,222,035
	Number.	Number.	Number.			
Poultry :—						
Alive ..	101	56	541,161	96	78	23,698
Dead ..	34,814	128,287	223,599	287,065	768,099	775,269
Game :—						
Alive ..	—	—	—	—	700	23,809
Dead ..	—	—	—	5,392	11,761	120,936

Total Imports of Meat.—The quantities and values of dead meat (excluding poultry and game) imported into this country during the last five years were as follows :—

	Quantity. Cwt.	*Value.* £
1918	25,349,367	173,795,759
1917	19,573,552	101,617,443
1916	23,347,847	93,382,476
1915	25,276,030	86,151,234
1914	23,587,820	62,222,035

Beef.—No *fresh* beef was imported in 1918. *Chilled* beef was imported to the quantity of 164,819 cwt., as against 1,495,075 cwt. in the previous year, showing a heavy decrease. In regard to value, the figures decreased from £7,226,700 in 1917 to £775,140 in 1918. Argentine (124,538 cwt.) and Uruguay (23,721 cwt.) were the principal countries of import, but in each case the quantities showed a marked decline, the respective figures for 1917 being 1,073,102 cwt. and 58,891 cwt. It is noticeable that the imports from the United States decreased from 335,803 cwt. to 33 cwt., and from £1,678,365 to £188 in value, while, as in the two previous years, the imports from Australia and New Zealand were nil.

In regard to imports of *frozen* beef, imports rose from 4,626,645 cwt. in 1917 to 7,532,367 cwt. in 1918 in quantity, and £16,791,758 to £35,647,800 in value. The countries whence the beef was consigned were as follows :—

—	1918.		1917.	
	Cwt.	£	Cwt.	£
United States	3,583,549	18,213,746	602,323	2,562,338
Argentine	1,879,167	8,646,962	1,598,030	5,336,463
Australia	551,609	1,976,733	1,107,704	3,784,994
New Zealand	460,289	1,635,046	760,094	2,709,385
Uruguay	186,411	847,892	171,912	726,602
Other countries	871,342	4,327,421	386,582	1,671,976

The most interesting features from the above table are the large decrease in the exports from Australia and New Zealand, the sudden rise of no less than 495 per cent. in the exports from the United States, and the almost stationary trade with Argentine.

As regards prices, the following figures per cwt. are given for the purpose of comparison :—

Imported Beef (declared Values at the Port of Arrival.)

—	1918.	1917.	1914.	Increase Per Cent. since 1914.
	s. d.	*s. d.*	*s. d.*	
Chilled	94 1	96 8	42 10	120
Frozen	94 8	72 7	43 5	118

*Home-Killed Beef (Market Prices).**

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
English :—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	
1st quality ..	119	6	121	0	92	0	78	6	61	6	94
2nd quality ..	119	6	115	6	87	6	74	6	58	0	106
Cow and bull :—											
1st quality ..	119	6	109	6	82	0	70	0	53	0	125
2nd quality ..	112	6	99	6	75	0	64	6	47	6	137
Irish, Port Killed :—											
1st quality ..	119	6	118	6	89	0	76	0	58	6	104
2nd quality ..	117	6	112	0	84	6	72	0	55	0	114

* These prices are the average wholesale prices of five big markets in England.

Mutton.—The following are the figures of *frozen* mutton imported from the different countries for 1918 and 1917 :—

—	1918.		1917.	
	Cwt.	£	Cwt.	£
New Zealand	1,234,005	5,041,073	1,235,275	4,793,705
Argentina	710,630	3,605,600	470,836	2,166,854
Uruguay	57,356	298,235	29,473	131,401
Australia	26,168	85,774	496,114	1,821,520
Other countries	61,374	256,500	310,748	1,341,953

It will be seen that, while the imports from New Zealand remained almost stationary, a marked decrease is noticeable in the case of Australia, and a large increase in the case of South America.

Home-Killed Mutton (Market Prices).

—	1918.		1917.		1916.		1915.		1914.		Increase Per Cent. since 1914.
Scotch :—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	
1st quality ..	127	0	136	0	112	0	92	6	82	6	54
2nd quality ..	127	0	126	6	105	0	87	6	77	6	64
English :—											
1st quality ..	127	0	133	0	109	6	88	0	77	6	64
2nd quality ..	127	0	124	6	103	0	82	0	71	6	78
Irish, Port Killed :—											
1st quality ..	127	6	130	6	103	6	85	6	74	6	71
2nd quality ..	127	0	121	6	98	0	80	0	68	0	87
Lamb, British :											
1st quality ..	127	0	142	0	123	0	100	6	95	0	34
2nd quality ..	127	0	133	0	113	6	93	6	87	0	46

In regard to the price of imported mutton, the average price per cwt. for 1918 was 88*s*. 11*d*. The respective prices per cwt. for 1917 and 1914 were 81*s*. 0*d*. and 43*s*. 11*d*., but these prices include both fresh and frozen mutton.

The market prices per cwt. of *home-killed* mutton during the years 1914–18 are given in the table on the previous page.

Pork.—It will be noticed from the table on p. 1464 that the quantity of pork *imported* during 1918 has considerably decreased. The bulk of the supplies was received from America. The respective prices per cwt. for 1918 and 1917 were 137*s*. 8*d*. and 96*s*. 10*d*., as against 54*s*. 10*d*. in 1914, showing an increase since 1914 of 151 per cent. The market prices of *home-killed* pork during the years 1914-18 were as follows :—

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
	s.	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	
1st quality ..	149	6	131	6	107	0	83	6	70	6	112
2nd quality ..	148	6	123	6	99	0	78	0	65	6	127

Bacon and Hams.—The main feature in regard to bacon and hams is the increased quantity imported. As in the case of pork, nearly all the supplies were received from the United States, the imports from that country in 1918 being—bacon 8,645,318 cwt. ; hams 1,419,908 cwt. The declared average prices per cwt. during 1914–18 are given in the table on p. 1463.

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
Bacon :—											
Canadian (green sides) :—	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	
1st quality ..	181	0	144	0	103	0	86	0	71	6	153
2nd quality ..	180	6	142	6	99	0	81	6	68	6	164
Irish (green) :											
1st quality ..	187	6	154	6	114	6	96	6	79	6	136
2nd quality ..	187	6	152	0	110	0	92	6	75	0	150
Hams :—											
American (green) (long cut):—											
1st quality ..	174	0	133	6	97	6	77	0	74	6	134
2nd quality ..	174	0	131	6	94	0	73	6	71	0	145
Cumberland, (dried or smoked) :—											
1st quality ..	—		190	0	157	6	123	0	119	0	—
2nd quality ..	—		182	6	150	0	116	0	108	6	—
Irish (dried or smoked):—											
1st quality ..	—		173	0	150	6	119	6	115	0	—
2nd quality ..	—		170	0	144	0	113	6	108	0	—

The market prices per cwt. of Canadian and Irish bacon, anc American and British hams during the years 1914-18, are given in the table on the previous page.

Rabbits.—Of the 522,542 cwt. of rabbits imported in 1918, 496,262 cwt. were received from Australia and 26,232 cwt. from New Zealand The average prices for imported rabbits were :—1918, 46*s.* 7*d.* per cwt. 1917, 43*s.* 9*d.* per cwt.

Poultry and Game.—101 live poultry were imported in 1918 (value £96) as against 56 in 1917 (value £78). The quantities of dead poultry were :—1918, 34,814 cwt. ; 1917, 128,287 cwt. ; and the corresponding values £287,065 and £768,099. The values of game imported during 1918 and 1917 were £5,392 and £12,461 respectively.

Dairy Produce and Eggs.—

Imports of Dairy Produce, Margarine and Eggs.

Description.	Quantities.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
	Cwt.	Cwt.	Cwt.	£	£	£
Butter	1,614,625	1,806,516	3,984,204	20,225,917	18,895,707	24,014,276
Margarine	302,591	1,807,806	1,529,219	1,567,767	7,778,285	3,977,361
Cheese	2,357,822	2,946,066	2,433,864	15,910,041	19,462,390	7,966,162
Milk, condensed :—						
Unsweetened ..	900,696	619,451	37,396	3,495,768	2,284,343	69,048
Sweetened ..	1,684,061	1,016,936	1,187,920	9,020,532	4,037,455	2,085,121
	Great Hundreds.	Great Hundreds.	Grea Hundreds.			
Eggs	*2,656,541*	*4,922,402*	*17,904,805*	*4,621,629*	*5,067,202*	*8,652,800*

The average declared value per cwt. of dairy produce and egg: imported during the years 1914-18 and the increase per cent. since 191 are given in the table on p. 1463.

Butter.—The figures given in the table above show a considerable falling off in the imports of butter into this country. Of the 1,614,625 cwt. imported, 372,572 cwt. came from New Zealand, 313,143 cwt

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
Imported*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	*s.*	*d.*	
(per cwt.) :—											
1st quality ..	248	0	209	6	173	6	146	0	119	6	108
2nd quality ..	248	0	206	0	169	6	143	0	115	6	115
British											
(per 12 lb.):—											
1st quality ..	28	3	24	10	19	6	16	9	14	7	94
2nd quality ..	28	2	23	10	18	5	15	9	13	7	107
Irish Creamery											
(per cwt.) :—											
1st quality ..	—		214	0	182	6	154	6	122	6	—
2nd quality ..	—		210	6	179	0	150	6	118	6	—
Irish Factory											
(per cwt.) :—											
1st quality ..	—		199	6	156	0	137	6	110	6	—
2nd quality ..	—		196	0	147	6	131	6	104	0	—

* Average of Australian, New Zealand and Argentine.

from Argentina, and 217,284 cwt. from Victoria. Denmark, which in 1917 sent us 622,160 cwt., only exported 40,327 cwt. to the United Kingdom. It is very noticeable that the export of butter from the Continent decreased considerably in favour of countries in more distant parts of the world (Australia, New Zealand, Argentina and the United States).

The *market prices* of imported and British butter over the same period were as given in the second table on the previous page.

For the average *declared value* per cwt. of butter imported, see the table on p. 1463; the increase since 1914 was 108 per cent.

Margarine.—The figures relating to the importation of margarine given in the table above (p. 1468), are instructive as suggesting the considerable development of the margarine trade in this country.

Cheese.—The importation of cheese has not shown a great falling off. The Netherlands trade declined from 244,865 to 87,896 cwt., and Canada, whence we received one-half of our supplies, sent us 1,125,668 cwt. as against 1,757,949 cwt. in 1917. The *market prices* of Canadian and British cheese during 1914–1918 were as follows:—

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
Canadian (per cwt.):—	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	
1st quality ..	145	0	144	6	107	0	88	0	72	0	101
2nd quality ..	145	0	143	6	104	0	85	6	69	6	109
British Cheddar (per cwt.):—											
1st quality ..	163	6	152	0	115	6	97	0	82	0	99
2nd quality ..	163	6	150	0	110	0	91	6	76	6	114
Cheshire (at London) (per cwt.):—											
1st quality ..	174	6	161	6	126	6	100	0	83	6	109
2nd quality ..	174	6	160	0	110	0	93	6	78	0	124

For the average *declared value* per cwt. of cheese imported see the table on p. 1463; the increase since 1914 was 106 per cent.

Eggs.—A study of the figures relating to the importation of eggs shows that, in 1918, we only imported one-seventh of the pre-war

—	1918.		1917.		1916.		1915.		1914.		Increase per Cent. since 1914.
Danish (per 120):—	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	
1st quality ..	—		26	7	21	8	18	1	13	6	—
2nd quality ..	—		24	5	19	9	16	4	12	3	—
British (per 120):—											
1st quality ..	43	3	26	6	20	2	16	2	13	6	220
2nd quality ..	41	2	24	3	18	4	14	11	12	4	234
Irish (per 120):—											
1st quality ..	43	2	25	10	20	3	16	2	13	3	226
2nd quality ..	41	8	24	6	19	2	15	3	12	3	240

quantity, although the cost was over one-half that of 1914 (see table on p. 1468). The principal countries whence the eggs were consigned were Denmark (1,170,535 great hundreds) and Egypt (729,807 great hundreds). Russia, which in 1914 exported to the United Kingdom 6,870,827 great hundreds, sent us none at all in 1918. The second table on p. 1469 shows the market *prices* of Danish and British eggs during the years 1914–1918

The increase in the average price per great hundred of the total quantity of eggs imported has risen 200 per cent. since 1914 (see table on p. 1463).

Grain and Meal.—

Imports of Grain, Pulse and Meals.

Description.	Quantities.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
	Cwt.	Cwt.	Cwt.	£	£	£
Wheat ..	58,029,710	91,435,006	103,926,743	53,167,786	84,506,598	44,734,079
Wheat meal and flour ..	26,359,600	14,339,782	10,060,223	35,526,683	18,469,502	5,549,048
Barley ..	5,025,200	9,138,500	16,044,422	5,426,012	8,967,855	5,660,312
Oats	10,934,700	12,621,700	14,156,715	11,478,674	11,557,746	4,674,417
Peas	2,180,495	1,284,990	983,694	5,405,696	2,473,034	546,470
Beans (other than haricots)	438,511	905,087	1,441,559	641,802	883,513	502,928
Maize ..	14,751,177	25,008,918	39,040,747	13,930,365	20,385,915	11,760,912
Oatmeal ..	2,908,429	2,291,387	609,992	4,842,330	3,864,529	502,938
Maize meal ..	1,428,465	1,666,567	232,469	1,616,990	1,968,611	78,895
Other corn and meal ..	14,719,803	15,764,242	13 828,443	22,367 673	21,923,016	5,626,270
Total ..	136,776,090	174,456,179	200,325,007	154,404,011	175,000,319	79,636,269

As regards the quantity of wheat and barley imported the figures for 1918 show a considerable fall as compared with 1917. The importation of wheat meal and flour has almost doubled, while as regards other corn meal there has been a slight decline. Oats also show a drop.

Our supplies of wheat, barley and oats during 1917 and 1918 were received principally from the following countries:—

Wheat.

	1918.	1917.
	Cwt.	Cwt.
United States	24,757,010	54,208,300
Canada	15,968,700	18,408,300
Argentina	14,475,500	6,700,600

Barley.

	1918.	1917.
United States	4,070,300	5,643,900
Canada	952,000	1,482,700

Oats.

	1918.	1917.
United States	6,009,400	8,114,700
Canada	3,409,700	2,219,500
Argentina	1,479,500	924,600

Maize was chiefly imported during 1918 from the United States, 8,040,177 cwt. (10,670,300 cwt. in 1917); and Argentina, 3,584,000 (9,578,200 cwt. in 1917).

A point of interest is that Russia, which contributed not inconsiderably to our supply of cereals before the War, has dropped entirely out of the list.

The following are the returns, in quarters, of the cereal and pulse crops of the United Kingdom during the years 1914–17. It is not yet possible to give the figures for the United Kingdom for 1918, but a preliminary statement of those for England and Wales was published on p. 1028 of this *Journal* for November, 1918 :—

—	1917.	1916.	1915.	1914.
	qr.	qr.	qr.	qr.
Wheat	8,040,352	7,471,884	9,239,355	7,804,041
Barley	7,184,843	6,612,550	5,862,244	8,065,678
Oats	26,020,909	21,333,782	22,308,395	20,663,537
Beans	474,081	892,572	924,155	1,120,078
Peas	278,141	261,090	300,338	374 038

Prices of Cereals.—The prices per cwt. of cereals *imported*, and the rises in price per cent. since 1914, are shown in the table on p. 1463. The prices per quarter of *home-grown* cereals, and the corresponding percentage increases in price, are given in the following table :—

Crop.	Average Price per Quarter.					Percentage Increase since 1914.
	1918.	1917.	1916.	1915.	1914.	
	s. d.	s. d.	s. d.	s. d.	s. d.	
Wheat ..	72 10	75 9	58 5	52 10	34 11	109
Barley ..	59 0	64 9	53 6	37 4	27 2	117
Oats	49 4	49 10	33 5	30 2	20 11	136

Three points are of interest in connection with the prices of cereals : (1) the price per quarter of *home-grown* wheat, barley and oats was less in 1918 than in 1917 ; (2) the price per cwt. of *imported* wheat was less in 1918 than in 1917, but in the case of barley and oats a slight increase occurred ; and (3) *the percentage increase* in the price of imported cereals is much higher than in the case of home-grown cereals. The tables show the ratios of imported to home-grown to be :—wheat, 114 : 107 ; barley, 205 : 117 ; oats, 219 : 136.

Fruit and Vegetables.—*Fruit* was imported to the value of £13,510,738 in 1918 as compared with £7,776,060 in 1917 and £11,118,051 in 1914. It is not possible to give the quantities which these values represent, but the following figures showing the decrease in the import trade of certain kinds of fruit which compete with the produce of British farmers are of interest :—

—	1918.	1917.	1914.
	Cwt.	Cwt.	Cwt.
Apples	410,169	889,755	2,929,649
Pears	2,426	59,562	409,871
Plums	—	47,307	207,680
Strawberries	—	300	30,723

Vegetables.—

Imports of Vegetables.

—	1918.	1917.	1914.
	Cwt.	Cwt.	Cwt.
Potatoes	1,015,793	1,598,952	3,332,164
Onions	4,343,270	4,748,009	7,513,513
Tomatoes	516,412	519,101	1,576,617

The potatoes imported during 1918 were valued at £1,087,325; onions, £3,783,788; and tomatoes, £2,077,612.

It is worth noting that 99·5 per cent. of the *potatoes* imported during 1918 were received from the Channel Islands. France, which sent us one-third of our imports in 1914, has not sent us any during the last two years. The potato harvest in England and Wales in 1918 amounted to 4,209,000 tons, by far the largest ever raised, and 868,000 tons (more than 25 per cent.) above the previous year's record.

Hops were imported in 1918 to the extent of 52 cwt., as compared with 9,078 cwt. in 1917 and 97,306 cwt. in 1914, and the high figure of 200,337 cwt. in 1915.

Feeding Stuffs.—The shortage of feeding stuffs during the War is well borne out by the figures in the table hereunder. In spite of the large decrease in the *quantity* imported, the *value* of the imports has risen considerably.

Feeding Stuffs.

Description.	Quantity.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
				£	£	£
Cotton seed tons	338,194	219,045	639,572	6,483,085	4,002,107	4,420,307
Flax seed or linseed qr.	1,310,278	1,003,431	2,451,778	8,164,199	5,438,130	5,723,846
Rape seed .. .. ,,	292,442	305,505	309,241	1,662,008	1,480,745	622,927
Soya beans .. tons	—	25,025	71,161	—	499,813	593,190
Nuts and kernels for expressing oil .. ,,	442,666	447,536	168,847	12,678,490	12,616,637	3,595,417
Oil seed cake .. cwt.	10,828	212,892	329,431	210,409	3,638,144	1,988,839

Manures.—

Imports of Manures for Home Consumption.

Kind.	Quantity.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
	Tons.	Tons.	Tons.	£	£	£
Basic slag	—	—	16,572	—	—	31,819
Bones, burnt and unburnt ..	5,144	3,876	34 404	121,982	41,623	186,001
Guano	—	2,601	39,285	—	27,675	232,086
Nitrate of soda	300	1,190	171,910	6,000	19,500	1,721,138
Phosphate of lime and rock phosphate	464,747	276,617	562,242	1 947,987	1,172,557	970,337

Exports of Manures Manufactured in the United Kingdom.

Kind.	Quantity.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
	Tons.	Tons.	Tons.	£	£	£
Sulphate of ammonia* ..	19,150	62,931	313,341	480,744	1,188,412	3,767,553
Superphosphates	2,547	3,204	66,051	16,421	20,120	175,449
Basic slag	1,065	1,825	132,269	3,638	6,561	211,075
Others	37,332	27,389	127,454	420,295	286,100	732,397

* The production of sulphate of ammonia in the United Kingdom in 1914 was 432,618 tons.

Exports of Animals.—

Description.	Quantity.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
Animals, Living—for Breeding —	Number.	Number.	Number.	£	£	£
Cattle: To United States	600	1,082	587	64,179	74,060	31,389
„ Uruguay ..	108	24	192	30,724	4,832	16,631
„ Argentina ..	780	766	605	174,783	142,725	69,232
„ Australia ..	16	19	85	2,930	4,017	8,996
„ Canada ..	313	526	—	28,340	43 998	—
„ Other countries	940	598	1,016	87,454	47,104	44,434
Total	2,757	3,015	2,485	388,410	316,736	170,682
Sheep and Lambs: To United States	1,181	894	722	15,695	10,945	6,664
„ Uruguay ..	205	117	738	7,484	2,760	11,640
„ Argentina ..	2,796	1,788	233	82,559	48,393	2,696
„ Australia ..	2	57	48	450	1,406	2,436
„ New Zealand	16	5	—	662	192	—
„ Canada ..	244	871	427	3,188	8,451	2,748
„ Other countries	396	122	856	10,403	2,449	9,801
Total	4,840	3,854	3,024	120,441	74,596	35,985
Swine: To Argentina ..	19	3	3	422	80	15
„ Canada ..	1	—	—	46	—	—
„ Other countries	77	147	411	4,138	1,254	5,384
Total	97	150	414	4,606	1,334	5,399
Horses: To Netherlands ..	2	—	10,392	200	—	87,596
„ Belgium ..	—	—	19,205	—	—	363,486
„ France ..	43	64	1,299	9,781	41,693	102,219
„ Other countries	938	1,225	6,810	265,282	316,351	511,721
Total	983	1,269	37,706	275,263	358,044	1,065,022
Animals of other Kinds—not for Food	4,819	20,529	32,336	18,616	39,926	48,561

The gradual rise in the prices per head is shown in the following table:—

—	1918.	1917.	1914.	Increase per Cent. since 1914.
	£	£	£	
Cattle	141	105	69	104
Sheep and lambs ..	25	19	12	108
Swine	47	9	13	262
Horses	280	278	28	900

Miscellaneous Imports and Exports.—The two concluding tables give particulars as to some miscellaneous imports and exports :—

Miscellaneous Imports.

Description.	Quantity.			Value.		
	1918.	1917.	1914.	1918.	1917.	1914.
				£	£	£
Wood and timber ..	—	—	—	29,181,919	25,645,897	25,343,111
Tallow and stearine cwt	452,354	649,841	1,737,182	1,698,423	1,979,274	2,861,676
Hides, dry .. „	561,752	711,919	639,208	4,291,840	5,173,302	2,976,458
Hides, wet .. „	1,065,402	911,333	753,287	7,636,910	6,583,944	2,935,281
Seeds, clover and grass .. .. „	232,795	204,354	175,905	1,375,831	727,908	410,737
Flowers, fresh ..	—	—	—	134,382	159,771	222,842
	Number	Number	Number			
Horses	54,929	21,870	8,662	3,763,472	1,380,039	315,887

Miscellaneous Exports.

Description.		1918.	1917.	1914.
Grain and flour	£	449,439	861,033	3,095,080
Meat (including animals, for food)	£	120,157	268,630	1,139,362
Wool (sheep or lambs) ..	lb.	2,333,300	6,987,700	38,458,000
	£	286,796	796,743	2,294,638
Hides and undressed skins	£	1,201,842	1,317,375	1,483,108
Oil seed cake	tons	70	85	41,566
	£	1,500	1,541	265,827
Agricultural Machinery—				
Prime movers, except electrical	£	71,974	63,342	1,157,661
Not prime movers or electrical	£	81,522	86,002	1,156,010

ERADICATION OF WEEDS BY SPRAYS AND MANURES.

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THE old established ways of weed destruction by appropriate methods of cultivation were sufficient and effective in the days when labour was plentiful and the land was less heavily cropped. Of late years, however, with the progress of intensive cultivation coupled with a constantly increasing shortage of labour, the problem has become critical, and many attempts have been made to supplement the mechanical means of eradication by

e rapid chemical methods. A considerable measure of ess has attended the venture, though the natural con- atism of farmers has hitherto prevented a general adoption ne new methods. This may be owing partly to the failure nany people to realise that it is possible to destroy the weeds his way without causing injury to the crop.

he chief reason that chemical weed killers can work success- y when applied to a growing crop lies in the fundamental erence in the habits of the majority of weeds and of such s as cereals. The leaves of many weeds are broad and standing, and are often wrinkled, so that if moisture falls them it is retained for a considerable time, often till it is d up by evaporation. Cereals, on the contrary, have long, row, smooth leaves which grow upright and are often ered with a waxy coating or " bloom," so that the leaves not remain wet for any length of time, as moisture cannot ere to them. If, therefore, corrosive or poisonous sub- nces are sprayed on to the plant, the cereals throw them off are not injured, whereas the weeds retain them and suffer full extent of the possible injury. This same characteristic, vever, renders it impossible to treat with chemicals such ad-leaved crops as clover, trefoil, sainfoin, and serradella, their leaves retain the injurious substance in the same way weed leaves. With root crops, the constant cultivation t is carried on is usually sufficient to keep weeds in check, that on arable land, as a rule, it is only cereals that are lt with by chemical means, though copper sulphate has n used to eradicate charlock from mangolds without injury the crop.*

These methods are not so useful on grass land, because, as herbage consists of a mat of plants with a large total leaf face, the chemicals are held up even by the grasses, and the ount of spray necessary to kill the weeds is sufficient to use serious injury to the herbage itself, especially to such oad-leaved plants as clovers, which are a valuable consti- ent of the crop. In the majority of cases it is not possible apply the spray in such a way that it reaches the weeds thout affecting the rest of the herbage, and in consequence e method is of but limited use on grass land.

The success of the chemical eradication of weeds depends to ne extent upon the weather. It is essential that the sub- ance employed should remain upon the leaves long enough

* Holmes Chapel Coll. of Agric. (1903).

to come into action, and, therefore, if heavy rain falls immediately after an application of liquid spray, much of the benefit is lost. Consequently it is sometimes necessary to repeat the operation if the weather breaks too soon after a dressing of the destructive agent. Dry substances would easily be blown off from dry leaves, so when these are used it is usual to carry out the work when the leaves are wet with dew or rain, as then the stuff adheres firmly when the leaves dry.

The chemical substances used as weed killers may be divided into two groups :—

1. Chemicals that merely destroy the weeds and have no direct beneficial action upon the growth of the crops. *These substances are usually applied in the liquid* form as *sprays*.
2. Compounds that not only destroy the weeds but also exercise a manurial action, thus directly benefiting the crop at a later date. These substances are usually very finely ground *manures* and are applied as dry powders when the leaves are damp.

1. SPRAYS.—Most of these are corrosive in nature and destroy the delicate plant tissues, either killing the weeds outright or so crippling them that they cease to be active competitors of the crop. The chemicals are applied in solution, the strength varying according to circumstances. The most commonly used sprays are copper sulphate, iron sulphate, and sulphuric acid, but other substances are occasionally employed. A summary of many of the earlier spraying experiments was drawn up by H. C. Long in 1910,* and the results of these have largely been confirmed by those set forth in the present paper.

Copper Sulphate.—Copper sulphate in solution is the most familiar of the weed sprays used on a farm, and is generally associated with the destruction of charlock (*Brassica Sinapis*), though it is effective with other weeds. The rough crinkled leaf of charlock renders it very susceptible to injury and, given suitable weather, spraying nearly always makes a considerable reduction. The spray is best applied when the leaves have three or four well developed leaves, though later applications are often effective. The writer saw a farm at Gedling, Notts, in which charlock had been successfully sprayed when in full flower, but this delay is not to be recommended. Various

* Long, H. C., The Destruction of Weeds by Chemical Means, *Knowledge*, October and November, 1910.

experiments have shown that a 4 or 5 per cent. solution (4 or 5 lb. copper sulphate in 10 gal. of water) is the most effective strength, about 40 to 50 gal., containing 16 to 20 lb. copper sulphate per acre being required. In all cases the quantity of liquid should be sufficient to wet the weed thoroughly. In some cases a 3 per cent. solution is strong enough, but only under specially favourable conditions.*

Copper sulphate will eradicate spurrey if it be used strong enough. 50 gal. per acre of a 5 per cent. solution is effective, but a 3 per cent. solution only destroys about half the crop, allowing the other half to recover and ripen its seeds†. In the latter case the shoots at first become brown and shrivel at the tips, so that growth is checked for a time, but later on recovery sets in with many plants. Poppies are far more sensitive than spurrey as even a 2 per cent. solution injures them, and it has been suggested that two applications of a 3 per cent. solution with an interval of a few days might prove very effective in destroying them.

If a soluble manure is added to a corrosive spray the action of the latter is sometimes accentuated, as the manure stimulates the crop and enables it to forge ahead before any weeds have a chance of recovering from the action of the spray. Corn buttercup (*Ranunculus arvensis*) is very resistant to the action of copper sulphate, as a 4½ per cent. solution has but little effect on it. In one case, however, a clearance was effected by applying a 9·9 per cent. solution of copper sulphate, with the addition of 22 lb. sodium nitrate to each 10 gal. About 35–40 per cent. of the weeds were killed or badly injured, and before the rest could recover and make much growth the wheat had benefited by the nitrate and grown right away from the weeds‡. Such strong applications of copper sulphate, however, are not to be advised as a rule, as they need very careful handling to avoid doing damage to the crops.

Iron Sulphate.—To a great extent this can be used as a substitute for copper sulphate, but stronger solutions of the iron salt are necessary to obtain equal results. On the Continent iron sulphate is largely used for the destruction of charlock, 40 gal. per acre of 7 per cent. solution being most effective, especially among oat crops. In German experiments much heavier dressings have been used satisfactorily, and when

* Charlock Destruction, Univ. Coll., N. Wales. Bangor Agric. Depart., Bull. I., 1909.

† Spraying of Charlock and Spurrey, *Ibid*, Bull. II, 1908. Destruction of Spurrey in Corn, *Ibid*, Bul. IX., 1906.

‡ Martin, J. B., C. R. de l'Academie d'Agriculture de France, II., 1916, pp. 420-424.

53 gal. per acre of a 22 per cent. solution were applied to infested oats not only was charlock destroyed, but the yield of oats from the treated plot was reported to be six times as heavy as that from a similar plot left untreated. In this case care was taken that the plants were quite dry before treatment, and the drastic effects on the charlock were visible within two days.* In this country the best results have been obtained with a 15 per cent. solution, that is to say, 60 lb. of iron sulphate dissolved in 40 gal. of water, per acre. The addition of molasses to the spray is sometimes recommended, as it causes the compound to adhere more firmly to the weeds.

Iron sulphate is better than copper sulphate for eradicating poppies and corn buttercup. A 15 per cent. solution destroys the weeds and does not injure the cereal crop ; for corn buttercup spraying should be done in February, and for poppies as soon as the seedlings have developed three or four leaves.

Although this spray cannot be used on broad-leaved crops growing alone, it may be safely applied when leguminous crops are associated with cereals, as the latter are the taller and, together with the larger weeds, receive the bulk of the spray, thus protecting the lower growing broad-leaved plants to a great extent.

Sulphate of iron may also be applied dry as a fine powder at the rate of 3–4 cwt. per acre† and should be broadcasted or scattered by machine in the early morning while the leaves are still wet with dew.

Sulphuric Acid.—This is the most potent substance utilised for weed destruction, and owing to its corrosive nature needs very special precautions in handling. If properly dealt with, however, it proves effective in cases in which the more usual sprays are of little value. Sulphuric acid is one of the few sprays that has been found to clear grass land of bracken. A 5 per cent. solution causes the leaves to wilt within a few hours, and some days later the stems turn black and wither, because the acid is gradually conducted along the midrib and down the stalk, eventually reaching almost to the underground rhizomes.‡ A new growth springs up later, but a second spraying disposes of this for the year and also weakens the plant for the future. Where the growth of bracken is dense the canopy formed by the bracken leaves protects the underlying herbage

* Hiltner, D., *Praktische Blätter für Pflanzenbau und Pflanzenschutz*, Jan.–Feb., 1911. (See *Journ. Bd. Agric.*, XVIII., pp. 41–42.)

† *Bull. de Sci. Nat. d'Agric.*, 1909, No. 5.

‡ Gordon, G. P., Bracken (*Pteris aquilina*) : Life History and Eradication. *Trans. Highland and Agric. Soc. of Scotland*, XXVIII., 1916, pp. 92–106.

from the harmful effect of the acid, and as the following year the fern is later in appearing the grasses are able to get ahead earlier, resulting in an improved pasture.

On the Continent, sulphuric acid is considered a safe spray for cereals if used when the crop has only about five or six leaves. It is much used in parts of France (Lot-et-Garonne) for destroying wild radish among wheat, 90–100 gal. per acre of an 8 or 10 per cent. solution being employed. It is somewhat selective in its action, as certain weeds escape, especially wild oat (*Avena fatua*), medicks (*Medicago* sp.) and members of the lily family (as wild onion). It is, however, deadly to most annual and biennial weeds as poppies, charlock, corn buttercup, cornflower, wild carrot, radish, vetches and vetchlings, and it is said to be very effective in clearing these pests from badly infested fields.* For general use 60–70 gal. per acre of a 10 per cent. solution is sufficient for oats, rather less being used for barley.†

Various other Sprays. — In view of the difficulty in obtaining large quantities of copper sulphate at the present time, preliminary experiments have been made to ascertain whether *nickel sulphate* can be used as a substitute. At Rothamsted charlock plants were sprayed with 3 per cent. solutions of nickel and copper sulphate to contrast the effects. The nickel sulphate proved to be the slower in acting, but six days after spraying young plants were dead with both sprays, while with a 6 per cent. solution the action was rather more rapid. At a later date some very large plants just coming into flower were sprayed, but though both substances burned the leaves rather badly, neither killed the plants. Probably stronger solutions would have been necessary at this stage, but this initial test indicates that nickel sulphate may prove to be an effective substitute for copper sulphate.

Arsenite of soda, potassium chloride and sodium bisulphate have all been used as weed killers, but each has some special disadvantage which prevents it from coming into common use. *Arsenite of soda* is exceedingly poisonous to man and beast, and there is a great risk of poisoning when the crops are used, especially if it be applied to grass land which is either fed off or cut for hay. Besides this it is strongly held by the soil, being retained for an indefinite period in the top few inches, and if several successive applications are made, enough arsenite of soda may accumulate to hinder the germination and

* Morettini, A., *Le stazioni sperimentali Agrarie Italiane*, LXVIII., 1915, pp. 693–716.

† Jaguenaud, G., *Le Progres Agricole e Viticole*, 29, 1912, pp. 332–334.

growth of crops sown on arable land and to exercise a harmful action on the herbage of grass land.

Potassium chloride is ruled out at the present time on the score of expense, but when prices were moderate a 20–30 per cent. solution was occasionally used for destroying charlock, as the solution shrivelled the plants up completely. The potash salt has no bad effect on the cereals, but rather works beneficially by acting as a manure in addition to destroying the weeds.

Sodium bisulphate resembles sulphuric acid in its action, and is readily and cheaply obtained in places. In parts of France farmers can get truck loads from the powder works at the rate of 9½*d.* per 220 lb. free on rail.* Eighty gal. per acre of 45 per cent. solution are recommended for use, but the stuff is most unpleasant to handle, though it needs less precautions than sulphuric acid.

To sum up, therefore, copper sulphate and iron sulphate are effective and simple sprays whose value has been proved by years of constant usage. Nickel sulphate, though practically unknown in this respect, offers possibilities and might repay more extended trial. Under special circumstances, sulphuric acid has much to recommend it, but the majority of other sprays are of less general value, though several of them meet the case under particular local conditions.

2. MANURES.—The method of improving grass land by judicious artificial manuring has been gaining much ground of recent years. Incidentally this secures the reduction of the less useful plants or weeds, but this reduction is chiefly brought about by the increase in the competition of the more valuable grasses and not by a direct poisonous action on the weeds.

During the last few years, however, attempts have been made to destroy weeds on arable land by the application of finely ground manures, especially cyanamide and kainit, and on grass land by the use of lime, gaslime and salt, and a fair measure of successs is considered to have rewarded the effort.

Calcium Cyanamide (*Lime nitrogen*).—Since this was introduced as a commercial manure it has been used a good deal in Germany as a means of destroying charlock and wild radish on arable land. It is claimed that dressings of 90–135 lb. per acre are quite effective for this purpose, provided that the cyanamide is applied when the plants are small and the leaves are damp†; thistles and poppies are injured as well as the

* Feuille d'information du Ministère d'Agriculture, XXIII., No. 8, 1918.

† *Deut. Landw. Presse*, 4th November, 1908; 21st January, 1914. *Mitt. der Deutsch. Landw. Gesell*, 20th July, 1907.

charlock. In some cases the crops turn rather yellow for a few days after application, but they rapidly recover and make use of the extra nitrogen supplied, giving increased yields. When, however, these experiments were repeated in North Wales* failure resulted, as a dressing of 80 and 120 lb. per acre had no permanent effect either on the charlock or the crop, and all the weeds recovered from the temporary check they received.

Kainit.—Kainit, applied to arable land at the minimum rate of 10–11 cwt. per acre, is said to be effective in destroying charlock and many other weeds.† It needs to be very finely ground and should be dusted on the plants when they are wet with dew or rain, if possible on the morning of a fine day. For autumn-sown cereals February or March is the best time of application, for spring-sown corn the manure should be spread soon after the seeds have germinated and put out a few leaves. As kainit tends to consolidate the soil, a dressing of lime is advised on very heavy land to prevent this as far as possible.

Weeds vary in their response to kainit, as some are easily destroyed, whereas others are only slightly injured or escape damage. The chief weeds have been classified as follows:—

Weeds badly injured or destroyed by Kainit.—Charlock, wild radish, black bindweed, speedwell, chickweed, nettle, groundsel, cornflower, mayweed.

Weeds moderately injured.—Persicaria, spurrey.

Weeds only slightly injured.—Sowthistle, fumitory, poppy, spreading orache.

Salt.—Salt is occasionally useful in reducing weeds, especially on grass land. Five to six cwt. per acre applied in the spring at the time nettles are cut down will do much to prevent this weed from springing up again strongly. A similar dressing in early April will also reduce oxeye daisy.

Thistles, however, do not seem to respond to treatment, as the effect of judicious cutting is not intensified by the application of salt.‡

Lime.—This differs in its action from the foregoing, as instead of directly destroying the weeds it makes the soil less suitable for certain of the worst pests on sown land, as spurrey, sheep sorrel, corn marigold and annual knawel. Spurrey is

* Charlock Destruction, Univ. Coll. N. Wales, Bangor, Agric. Depart., Bull. I., 1909.

† *Landw. Jahrb.*, Bd. XLVI., 1914, pp. 627–657. (The destruction of weeds by kainit is at the moment of academic interest only, the cost of the substance being prohibitive.—*Ed.*).

‡ Destruction of Thistles. Field experiments at Harper Adams Agric. Coll. Report, 1908.

chiefly associated with light soils that are deficient in lime, and sheep sorrel, though it is found on both light and heavy soil, also indicates lime deficiency. Liming has been tried for the eradication of both these weeds, with indifferent success in the case of spurrey, with rather more success with sheep sorrel. When these weeds are abundant the shortage of lime is usually very marked, and an impossibly heavy dressing would be needed to alter the balance so as to make the soil really unsuitable for weeds. An ordinary dressing, such as 1 or 2 tons of lime per acre, has no effect on spurrey, though it brings about some improvement in the soil itself, and may thus tend to suppress the weed by encouraging the competition of other plants. This is particularly the case on grass land, on which sorrel (*Rumex Acetosa*) and sheep sorrel (*Rumex Acetosella*) are usually much reduced when liming is resorted to. It is usual to apply about 30 cwt. per acre to light land ranging up to 3 tons per acre on heavy, wet soils.

Gas lime, at the rate of 20 tons per acre, has proved effective in destroying false brome or tor-grass (*Brachypodium sylvaticum*) on Down pastures.* The gas lime was applied in autumn, and soon killed the tor-grass (and other grasses as well). The following spring the land was harrowed and worked up to a fine tilth preparatory to sowing a mixture of good grass seeds for the provision of a strong new turf. Such a method could only be applied when the area affected is small.

Taking all things into consideration, the use of finely ground manures as weed killers offers possibilities, but up to the present the results have been so uncertain and variable that it is not yet advisable to make definite recommendations for their use. Experimental work in this direction could easily be extended, as even though failure should attend the effort to destroy the weeds, the beneficial effect of the manure on the growth of the crop would offer considerable compensation.

* Hutchinson, H. P., Tor-grass or False Brome and its Eradication from Down Pastures, *Journ. Bd. Agric.*, XIX., 1912, pp. 648–657.

FAGGOT DRAINING.—BUSH DRAINING.—WOOD DITCHING.

FAGGOT or bush drainage is an ancient practice, still in use in several localities, especially in the Eastern Counties of England. As the present shortage of drain pipes is likely to continue for some time it is felt that the practice might be extended, especially in connection with mole drainage on heavy clay soils. Faggot drains may be expected to last as long as the mole drains which they serve.

The purpose of this article is to explain briefly the methods usually employed in the making of faggot drains in connection with mole drainage, but the system outlined, with certain modifications, has been successfully adopted under other conditions; for instance, on boggy land or other soils where pipe drains might shift.

The object aimed at in the construction of a bush drain is to secure an underground passage for water. This object is gained by laying brushwood and other material in the bottom of a trench in such a way as to support the covering soil without either itself impeding the flow or allowing the soil to drop through and choke the drain. Later, when the brushwood rots the passage becomes clearer.

Care is necessary at each stage of the work.

Digging the Trench.—The trench should be dug with steeply sloping sides and narrowed to a width of not more than 3 in. at the bottom. Used as a feeder it should not be more than 27 in. in depth. A plough will save some depth in digging, but it is important *that the trench should be cut narrow*, the ditcher working from above, and not in the trench. Afterwards ordinary drainage tools are used; for taking out the lower spits a narrow spade about 12 in. long, 4½ in. wide at the top, and 2 to 2½ in. at the bottom is serviceable. The ditcher should be careful to keep his spade wet in order to get the sides of the trench cut clean. The lower spits, when taken out, must not be mixed with the upper soil. The bottom should be finished with a draining scoop or hoe in the same way as for drain pipes. It is most important that the bottom should be smooth and level. The trench must, of course, be dug from the outfall upwards.

Material for Filling.—The brush may consist of any wood, but whitethorn and blackthorn are the most favoured. Willow, alder, hazel, or dogwood, in fact anything that grows fairly straight, may be employed. The wood should be used green.

The brush should be cut about 2 in. diameter at the butt. .f brush of this thickness is not to be had, and smaller is used, t should be more bunched together. It should be as nearly .s possible of the same length and as long as it can be cut, emaining fairly straight ; naturally, some woods cannot be cut .s long as others. Projecting branches should be nicked with he bill, so as to be the more readily pressed into the narrow ›ottom of the trench, without pulling in the sides.

Laying the Brush in the Trench.—This operation requires care. The point to be remembered is that the bushy ends must lways be kept on top, pointing away from the outfall. Consequently, the workman who lays in the brush must work in he direction from the head to the outfall. The butts must

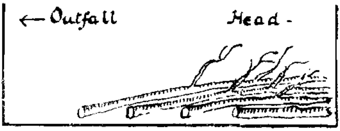

Fig. A.—Right Method.

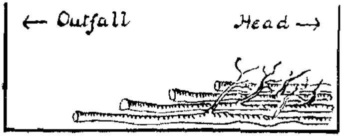

Fig. B.—Wrong Method.

(N.B.—The figures show a longitudinal section of the trench).

:st on the bottom of the drain and each fresh butt must be laced a little more towards the outfall than the last, so that ıe sticks overlay continuously. (*see* figures.) Two objects are ıus secured : the butts, pointing downwards, will not stem ıe flow of water, while the bushy ends will overlie the butts,) act as a support to the covering soil.

The workman must not stand in the ditch while laying the rushwood.

The brush is pressed securely in place with a crotched stick ke a clothes prop and then trodden firm, but great care must

be taken not to knock loose soil into the bottom of the trench. The brush, when pressed down, should have a depth of not more than 6 in. or 7 in.

Above the wood, straw (usually barley straw) is laid to a depth of 2 to 3 in. Some prefer to make the straw into a thick rope, using a straw winder, and to lay this rope, which can be made in lengths of 12 to 18 yards, in long coils over the brush.

The object of the brush is to support the straw; the object of the straw to support the covering soil. The amount of brush or straw used should be no more than sufficient for the purpose. A good deal will depend on the nature of the ground; tough clay will not require the same amount of support as less tenacious soil or soil in which there may be a little gravel. Something too will depend on the nature of the brushwood. But it is better to err on the side of too much than too little support.

In place of straw, rushes, grassy hedge brushings, sprays of pine or heather may be used. Sometimes heather is used alone, without any larger brush.

Filling in the Earth.—This also requires care. The workman should start from the outfall end and work towards the head. By so doing he will cause the fine twigs to overlap better and so to fulfil their purpose of supporting the roof.

The lower spits should be taken up with the hand, laid upon the straw and well trodden down. After this the plough and the shovel may be used. But if the tough lower spits are not first placed firmly in position, there is a danger lest the more friable surface soil should fall in and work its way into the drain, if not at once, at any rate after the straw and brush have decayed. If carefully laid, however, the lower spits tend to form a solid arch.*

If the drain is at all long, it is advisable to construct it in sections, finishing off a section each day completely. The connecting up of the brushwood at the ends of each section will require a little care, but should present no real difficulty.

The Outfall.—At the outfall, which should, of course, discharge down, not square across or up, the main drain, either some drain pipes should be placed or a square pipe about 4 ft. long, constructed of creosoted boards 1 in. thick, and 4 to 5 in. wide. Another plan is to allow some good stout butts to

* In cases where the drain is intended to drain the soil, rather than to take the water from tributary mole drains, less packing of the overlying soil will be required. A certain amount of the stiff lower soil should, however, be used to cover the brush. Where tiles are used brush may be packed on top of the tiles, thus securing a greater capacity for the drain.

project 6 to 12 in., but this should only be done when there is no danger of an obstruction being caused thereby in the open drain. *Flat stones might also be employed.*

In cases where, as often happens, the brush drain runs through a headland into the ditch, pipes should be laid in the section under the headland, otherwise the drain may be squeezed by pressure overhead.

In any case a grating must be provided or a few lengths of stout wire placed upright before the outlet or crossed X-wise through holes drilled in a drain-pipe, to prevent rats or rabbits finding their way into the drain. A certain amount of broken glass mixed with the soil at the outlet will prevent vermin burrowing.

Connecting up with Mole-drainage.—When brush drains are to to be used as mains in connection with mole-drains, they are usually completed first, at least 6 in. deeper than the depth at which the mole is to be drawn. When the mole draining is being carried out, the mole is drawn across the main drain just above the brush. But if the main runs athwart the slope of the field, there is a danger of the water in the moles being carried across the main into the openings of the moles on the other side, with the result that the main does not do its fair work and the land lower down the slope may get waterlogged. In this case the moles are best put in first and the mains cut immediately afterwards. The mole openings on the lower side of the mains can then be plugged before the mains are filled in.

(*This Article is also issued as Food Production Leaflet No. 62.*)

SMUT DISEASES OF BARLEY AND OF OATS.

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A PAPER appeared in the issue of this *Journal* for October, 1916 (Vol. XXIII, No. 7) dealing with the Smut Diseases of Wheat, and the present article is intended as complementary thereto. It completes the tale of the "Smuts" as far as they

affect the cereals commonly grown for grain in this country: and in order to facilitate reference, the series is concluded by a synoptic survey, in tabular form, of the diseases under consideration (including those previously dealt with as attacking wheat), their diagnostic symptoms and the methods of treatment applicable in each case.

SMUTS OF BARLEY. — Barley is subject to two kinds of smut, caused by two distinct species of fungus. The appearance of the two diseases is somewhat similar, but the life histories of fungi responsible are essentially different; and whereas one disease is easily combated, the other is extremely difficult to deal with.

1. Loose Smut (*Ustilago nuda*, (Jens.) Kell. et Swing.).—An attacked plant is very similar in appearance to a wheat plant suffering from loose smut. When the crop shoots, diseased ears are seen to be almost wholly destroyed, the grains being replaced by a mass of black powder, which quickly blows away, leaving a bare stalk (Fig. 1, A, B). The black powder is made up of countless spores of the fungus. These spores are indistinguishable from the spores of the loose smut of wheat, and they germinate in a similar way (Fig. 1, C, D).

The life-history of the fungus is identical with that of *Ustilago Tritici* (except that the host plant is barley instead of wheat). The spores infect the young grain at the time of flowering, and produce within it a small amount of mycelium, or "spawn." The grain develops normally, however, despite the presence of the parasite. When such grain is sown the fungus develops with the young plant, and eventually destroys the ear. These facts, discovered by continental workers, have recently been verified by the writers, *e.g.*, in one of the experiments flowers of barley were artificially inoculated with spores of the disease by means of a small brush. The plants were marked and the grain therefrom collected when ripe. A few were examined microscopically, when hyphæ of the fungus could readily be detected both in the embryo and endosperm. The remaining grains were sown after "pickling" in formalin. Over 25 per cent. of the resulting plants were diseased.

On the other hand, all attempts to infect the young plant by means of spores sown with the seed have failed.

Though the disease is so similar to loose smut in wheat, it is impossible to infect wheat with spores from barley, or barley with spores from wheat.

Prevalence of the Disease.—In the north-east, this disease, though wide-spread, is not abundant. The majority of barley

fields have a few diseased ears, but the proportion is in most cases a very small one.*

Treatment.—Numerous investigators have devoted attention within the last few years to the knotty problem of a practical method for the control of loose smut. Many fungicides have been tried. The only one giving promise of success is hot water. Details of the hot-water treatment were given in the previous article in this *Journal*, on loose smut in wheat.

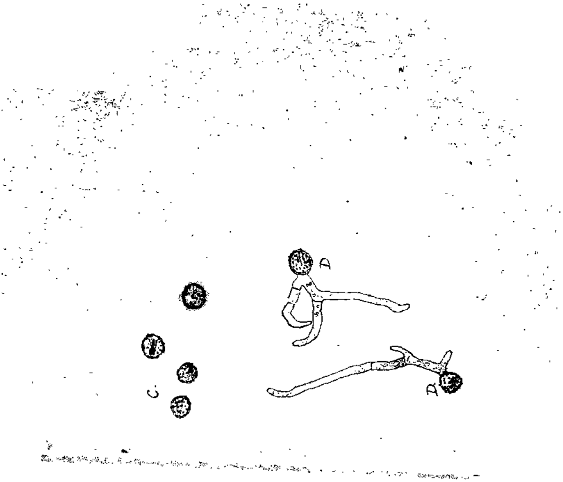
Briefly, the grain is placed in a sack or basket and allowed to stand for about four hours with occasional swaying to and fro in water, either cold or, preferably, lukewarm; it is then transferred for five minutes to water at about 120° F., and finally to a tank of hot water for ten minutes, the contents of the tank being kept as nearly as possible at a temperature of 124° F. by the addition of hot or cold water in small quantities as it becomes necessary. The water in the tank should be kept below 131° F. The grain is then spread out to dry.

Formerly, the same temperature was employed as for wheat (126°—129° F.), but two workers have lately shown, independently, that 124° F. is more satisfactory. Lakon has found barley treated with hot water to be slightly improved in germination, as shown in laboratory tests, but to be reduced in capacity for growth in the field. The latter fact agrees with the writers' observations, and with general experience. In view of this, and of the natural swelling of the soaked grain, in drilling barley so treated the normal seed rate per acre must be increased by one-fourth.

2. Covered Smut (*Ustilago Hordei*, (Pers.) Kell. et Swing.).—An attacked plant may be detected when first the crop "shoots" by the dark colour of its ear, but it becomes much more conspicuous towards harvest time. The ear is small, but is not as a rule noticeably distorted (Fig. 2. A). On examination, however, the grains are seen to be replaced by black masses, each enclosed in a thin, semi-transparent skin, the whole ear presenting a silvery appearance. Very commonly this skin is broken on many of the grains before harvest, in which case the black mass within becomes more conspicuous. The awn is not usually destroyed, and the sterile spikelets of the ear generally develop normally.

Diseased ears are harvested with the healthy, and in the thresher the spores of the fungus, which constitute the "smut,"

* In a few districts loose smut appears to be commoner than covered smut. Stapledon observes, for example, that this is the case in some Cotswold areas.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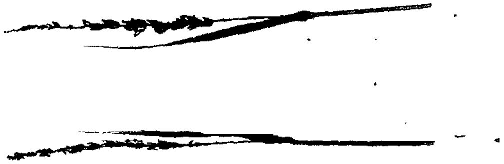

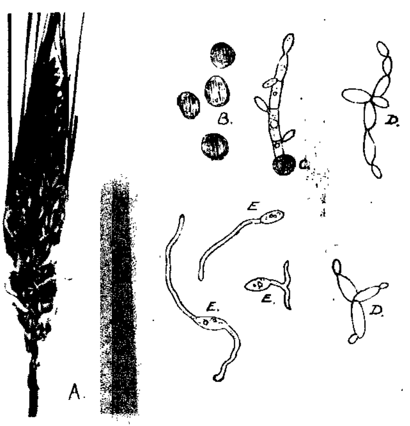

FIG. 2.—Covered Smut of Barley. A, Smutted Ear; B, Spores × 710; C, Germination of Spore; D, Conidia budding; E, Germination of Conidia.

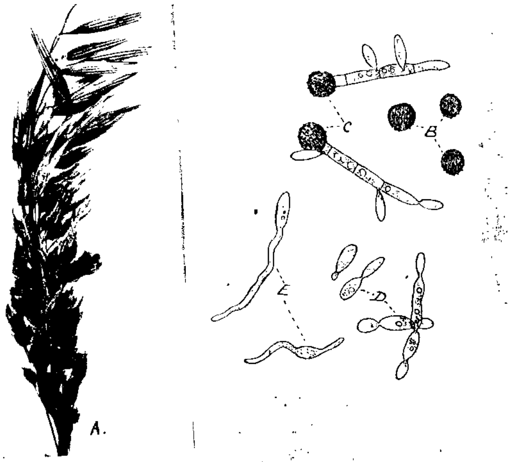

FIG 3.—Loose Smut of Oats. A, Head partially destroyed by Smut; B, Spores × 700; C, Germinating Spores × 700; D, Conidia budding × 700; E, Germinating Conidia × 700.

are set free, many of them finding their way on to the healthy grain. As a rule a number of the smutted heads break up in the thresher, and bits of them with attached masses of black spores are found in the threshed corn. The thoroughness with which the spores are distributed through the grain during threshing is remarkable. In a 1-lb. sample of barley recently examined by one of the writers, two small pieces of a smutted ear were found, indicating that the seed was from a diseased crop. Though the grain was not markedly discoloured, immense numbers of spores were found in water in which half-a-dozen grains had been washed. Badly-smutted grain is often recognisable by its dark colour. Such discoloration is, however, frequently attributed to other causes, such as smoke.

The spores differ from those of loose smut, in that they are rather larger and smooth walled (Fig. 2, B). They germinate readily in water or nutrient solutions. The method of germination varies slightly according to the conditions under which it occurs. In a nutrient solution, such as a decoction of plums or a watery extract of a fertile soil, the spore gives rise to a short tube bearing a succession of small, oval, colourless secondary spores or conidia (Fig. 2, C). The latter become detached, and increase in number by a process known as "budding." A small protuberance appears on the conidium, swells to the size of the parent spore, and then breaks away, to repeat the process indefinitely (Fig. 2, D). In the course of a few days an immense number are thus produced. Eventually the conidia germinate, each producing a germ tube capable of infecting the young barley plant (Fig. 2, E). If the spores are germinated in water, on the other hand, they produce a long tube which branches, but which bears very few conidia; and the latter seldom multiply by budding.

These facts are not without practical significance. As it is the conidia which infect the barley plant it is evident that anything promoting conidia-production will favour infection, and, conversely, that the fewer the conidia produced, the less chance of infection there will be. In the light of these facts is to be interpreted the common belief that heavily-manured crops are more prone to smut than crops on poor ground. Brefeld tested this theory in the case of oat smut (which has a similar life-history), and found that a much higher proportion of smutted plants resulted on ground which had been heavily dunged than on unmanured soil.

The spores retain their vitality for several years. Infection takes place during the seedling stage, the fungus boring into

the barley plant, and making its way to the tip of the stem, while the latter is still below ground. From this point onwards the progress of the disease is similar to that of other varieties of smut. Until the plant commences to form an ear the parasite inflicts no visible harm ; but as soon as ear-formation commences the fungus begins to grow more rapidly, and forms great quantities of spores, destroying the tissues of the ear.

Spread of the Disease.—As in the case of bunt in wheat, threshing machines, winnowers, and grain sacks undoubtedly act as disseminators of the disease spores. Infected grain does not appear, however, to be quite as general as bunted wheat. Stapledon* examined 47 samples of barley at Aberystwyth and found that 28 per cent. of them were contaminated with spores of the disease. In the experience of the writers it is far more common than the "loose" smut. In most seasons it is rare to find a barley field quite free from it.

Treatment.—It is evident from the life-history of the fungus that the disease may be prevented by methods similar to those recommended for bunt, *i.e.*, "pickling" the seed. Barley is not quite such an easy subject as wheat to handle, however, being more easily injured by fungicides. Of many possible fungicides, discussion may be limited to two—copper sulphate and formalin.

1. *Copper Sulphate.*—Copper sulphate by itself is an effective but dangerous dressing. A 5 per cent. solution of copper sulphate (½ lb. to 1 gal. of water) may be used if the seed is thoroughly dusted over with powdered lime after the copper sulphate has been applied. This treatment, however, has little to commend it. Without lime, a 5 per cent. solution of copper sulphate has been found very harmful.

2. *Formalin.*—This is the most satisfactory dressing yet tried. It should be used at the strength of one tablespoonful† to 1 gal. of water. It is applied in the same manner as copper sulphate. Regular treatment of seed barley with this substance is strongly advocated. It is greatly to be regretted that spurious preventive dressings are so extensively used. Some of these claim to give protection against both birds and smut. The writers have not found any dressing satisfactory for both purposes simultaneously. If the two troubles are expected, the grain should be first pickled, then dried, and the "bird" dressing applied afterwards.

* Report on seed tested at the Agricultural Department, University College of Wales, Aberystwyth, Season 1914.

† An ordinary medicine bottle makes a convenient measure.

"Pickling" of seed is more necessary with barley, perhaps, than with any other cereal. Not only does it prevent covered smut, but it is also an excellent preventive measure against the disease known as "stripe" or "deaf ear," which causes great annual loss in many districts.

SMUTS OF OATS.—There are two smut diseases of oats, but it is difficult to distinguish one from the other.

1. Loose Smut (*Ustilago Avenæ*, Pers., Jens.).—This is the oat smut common in England. Diseased plants are characterised by the presence of black powder replacing the grain (Fig. 3, A). The chaffy scales around the grain are also more or less destroyed—hence the name "loose." The extent of the chaff destruction is, however, very variable; sometimes the whole is destroyed, sometimes it is scarcely injured.

The fungus causing the disease is characterised by small, brown-black, oval to spherical spores with a thick wall, covered with minute spines (Fig. 3, B). The spores which constitute the black powder are partly blown away before harvest, and the remainder are distributed during the threshing, many of them finding their way on to healthy grains, with which they are eventually sown.

On germination the spore produces a short tube bearing a succession of colourless conidia, which may bud in a similar way to those of *Ustilago Hordei* (Fig. 3, C, D). Infection takes place while the plants are in the seedling stage. Subsequent development of the fungus is similar to that of other smut fungi.

2. Covered Smut (*Ustilago lævis* (Kell. and Swing.) Magn.).—Diseased plants are similar to those attacked by loose smut except that the scales around the grain are less affected. The fungus differs from that of loose smut only in the possession of a smooth-walled spore; the life-histories of the two are said to be identical. This disease does not appear to be common in England.*

Treatment.—Covered smut in oats may be prevented by "pickling" the seed before sowing.

Copper sulphate is not to be recommended for this purpose. Even a 3 per cent. solution has had deleterious effects on germination. In field experiments at Cockle Park in 1916, the crop from seed which had been dressed with a 3 per cent. solution of this substance was thin and poor, charlock and other weeds making great headway in consequence.

* The writers have only met with it twice, and have not used it in experimental work.

In field experiments conducted in 1915 on the Isle of Gigha,* Argyllshire, the sulphate of copper treatment gave such disastrous results that the whole of the area sown with seed thus treated had to be resown.

Copper sulphate is not so effective a fungicide when used on oats as with other cereals.† Apparently this is due to the fact that smut spores lodge in between the scaly husks of the "seed" and are not reached by the liquid.

Formalin in the strength of two tablespoonfuls to 1 gal. of water has proved itself a reliable "pickle." In field experiments at Cockle Park in 1916 no smut was seen in the plot sown with infected seed which had been so dressed, while a scattering of smutted heads was observable in the crop from untreated seed. A sample drawn at the time of sowing from a bulk of seed treated on a field scale at Cockle Park in 1917 gave, in laboratory tests, a germination capacity of 98 per cent., and in the field germination appeared perfectly equal to that of the untreated seed. In this experiment also, no smut was seen on the treated plot, while on the untreated, diseased heads were found scattered throughout the crop.

In the Isle of Gigha experiments quoted above, oats pickled in formalin gave 98 per cent. germination when tested in Government laboratories, and on the farm Mr. Philip obtained a higher yield, both of straw and grain, a higher bushel weight, and a lower proportion of "tails" from the formalin plot than from the untreated, and, in addition, while the untreated crop was badly smutted, no single smutted head was found among the oats treated with formalin.

SMUTS OF RYE.—Hitherto the area of rye grown for grain in this country has been very small, and there is no record of smut having given serious trouble. In view, however, of the largely augmented area at present under rye, and the loss caused by smut in some American States,‡ a note upon the subject may serve a useful purpose. There are two so-called "Smuts" of rye. One, the "Stinking Smut," is caused by *Tilletia separata* (Kunze), a fungus closely related to the fungus of wheat bunt, and having a similar life-history. The spores,

* On the Home Farm of W. J. Yorke Scarlett, Esq. Results kindly communicated by Mr. W. W. Philip, Factor, who devised and conducted the experiments.

† Pickling with copper sulphate frequently produces a very curious effect. When sown the oats develop shoots more or less normally, but no primary roots appear. Adventitious roots may appear upon the young stem later.

‡ Minnesota and North Central States principally.

produced in masses in the kernel, are similar to those of bunt in appearance.

The second rye smut is the work of *Urocystis occulta* (Rabenh.) Plow., a fungus similar in life-history to that causing onion smut. Black streaks are produced on the stems and leaves, consisting of spores, produced in clusters, the central one, two, or three of each cluster being fertile, the remainder empty and sterile. Both diseases are amenable to pickling treatment, and formalin at a strength of 2 tablespoonfuls per 1 gal. of water will probably be found satisfactory.

Summary of Smut Diseases of Cereals.

Crop.	Disease.	Characteristics of Disease.	Treatment.
Wheat.	Bunt ..	Contents of grain replaced by black powder. Infection from spores present on seed when sown.	Pickle seed with :—(*a*) formalin (2–3 tablespoonfuls per 1 gal. of water) ; (*b*) copper sulphate (1 lb. per 1 gal. of water.
	Loose Smut or "Smutty Collier."	Ear completely destroyed except for central stalk. Infection during flowering stage ; infected grains develop normally and are harvested with healthy grains.	Soak seed for 3–4 hours in cold water then place in water at 126°–129° F. for 10 minutes.
Barley.	Covered Smut.	Grains destroyed ; masses of spores which take their place remain intact till the crop is threshed. Infection from spores present on seed when sown.	Pickle seed with formalin (1 tablespoonful per 1 gal. of water.
	Loose Smut.	Almost identical in appearance with loose smut of wheat. Infection during flowering stage.	Treatment as for loose smut in wheat, except that the temperature of the water should be kept at 124° F.
Oats.	Loose Smut.	Grain and more or less of surrounding chaff destroyed. Infection from spores on seed when sown.	Pickle seed with formalin (2 tablespoonfuls per 1 gal. of water).
	Covered Smut.	Chaff less destroyed, otherwise similar to loose smut. Infection from spores on seed.	Pickle as for loose smut.
Rye.	Leaf Smut.	Powdery black streaks on stem and leaves. Spore clusters present on seed.	Pickle seed with formalin (2 tablespoonfuls per 1 gal. of water.
	Stinking Smut.	Similar to wheat bunt. Infection by spores present on seed when sown.	Pickle as for leaf smut.

FURTHER NOTES ON THE POWDERY MILDEWS AND THE AMMONIUM POLYSULPHIDE WASH.

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MENTION has already been made in this *Journal** of the discovery of a new wash—ammonium polysulphide—which is fungicidal for "powdery mildews" (*Erysiphaceae*), such as American Gooseberry-mildew, Hop-mildew, etc.

It was then pointed out that while the lime-sulphur wash was regarded (as it still is at the present time) as undoubtedly the best general wash against mildews for use early in the season, the ammonium polysulphide wash was valuable for use later in the season to protect the ripening gooseberries (particularly the later dessert varieties), since this wash, unlike the lime-sulphur wash, leaves no visible deposit on the berries. A formula was then given for making an ammonium polysulphide solution sufficiently concentrated to be diluted 20 times in order to make a summer wash of fungicidal strength.

During the past three years further investigations have been continuously carried out on the subject of the control of powdery mildews by sulphur-containing washes. The object of the present article is to point out to farmers and others (1) that new facts have been discovered relative to the "killing point" of powdery mildews, and (2) that an improved formula has been found for making the concentrated ammonium polysulphide solution.

It became clear during the course of the investigations that a powdery mildew varies in power of resistance to a fungicide according to its stage of development. The work was carried out with the hop-mildew (*Sphærotheca Humuli*, [DC.] Burr.) and the following facts, illustrating the above point, are taken from the life-history of that mildew; there is every reason to believe, however, that the same fact holds good in the case of other mildews.

Like all powdery mildews, the hop-mildew is propagated by minute bodies called *spores*, each of which acts like a seed of the higher plants in giving rise to a new individual. When a spore reaches the surface of a young, healthy hop-leaf, it begins

* See this *Journal*, February, 1916, p. 1118, and February, 1917, p. 1098.

to grow by putting out a little "root," the *germ-tube*, which fixes it to the surface of the leaf, and from the tip of this germ-tube it sends a *sucker* into the leaf to extract from its sap the food-material it requires. In the case of a rapidly-growing young hop-leaf a small convex "blister" or "hump" results at the place where the infection takes place. At first this "hump" is green, but very soon a delicate, white growth, consisting of extremely fine, radiating threads, can be seen extending over its surface. This white growth is the first-formed "spawn" (*mycelium*) of the young mildew-patch. Proof has been obtained that during this stage of development, viz., from the germination of the spore to the production of the very young, sterile "spawn" (*mycelium*), the mildew offers the maximum resistance to the fungicide, requiring not less than double the strength which is lethal in the later stage.

The next stage of development of the mildew is the gradual production of chains of spores, produced in a necklace-like string on upright branches from the creeping "spawn" on the surface of the leaf. The spores thus produced fall off when ripe and collect in little powdery masses, giving that "frosted," "mealy" or "powdery" appearance to the mildew, so familiar to the farmer when he finds the mildew "running" through his hop-garden or gooseberry-plantation. The spores are soon carried about by the wind and so spread the disease. In this "powdery" stage the mildew, particularly if it is growing on the older leaves, is more easily killed by the wash.

The concentrated ammonium polysulphide solution made on the improved formula given below can be diluted at the rate of 1 gal. to 100 gal. of water, at which strength it is fungicidal for all "powdery" mildew-patches (even on the youngest leaves where they are more difficult to kill than on the older leaves). At this dilution it will not kill the mildew in its earliest stages of development, consequently a second application should be given at the end of a week or ten days, by which time the mildew patches in the earlier stages of development will have grown into "powdery" patches. Greenhouse experiments have proved that the solution at double the above strength is almost, if not quite, fungicidal for all stages of the mildew.

A general recommendation can be given to use the above wash in two applications at the strength of 1 to 100; experiments on a small scale using the wash in one application at the strength of 1 to 50 might profitably be made by the farmer. The method of preparing the wash at both strengths is given below.

Preparation and Dilution of the Ammonium Polysulphide Solution.—*Stock Solution.*—One gal. of a 30 per cent. solution of ammonia in water is saturated at ordinary temperature with sulphuretted hydrogen gas until the density of the solution is 0·955. Two gal, of 30 per cent. aqueous ammonia are then added and 112½ oz. of "flowers of sulphur" stirred into the liquid. A further current of sulphuretted hydrogen gas is then passed through the fluid until all the sulphur dissolves and the density of the solution becomes 1·036 at 17° C. (63° F.). The clear, dark-coloured solution which results constitutes the new stock solution, and may be referred to as the ammonium polysulphide stock solution 1918 (A.P.S., 1918). In the preparation of this solution, care should be taken to avoid the use of copper utensils and to exclude, as far as possible, free access of air to the vessels during the manufacturing process.

When made according to the above directions, stock solution A.P.S., 1918, should contain 19·2 per cent. of ammonia and 24·2 per cent. of sulphur, of which 10·6 per cent. is in the condition known as sulphide sulphur and 13·6 per cent. in the form known as polysulphide sulphur. This stock solution is miscible with considerable quantities of water without becoming turbid. After standing for about twelve hours when diluted to the extent of either 1 part to 50 parts of water, or 1 part to 100 parts of water, the fluid may become cloudy and finally thick with a deposit of sulphur.

Dilution.—Strength (*a*).—To prepare this diluted wash from the stock solution, 5 lb. of soft soap are dissolved in 99 gal. of water, and into this soap solution 1 gal. of stock solution A.P.S., 1918, is mixed by stirring. In this manner 100 gal. of wash are prepared, ready for use, containing 0·5 per cent. of soft soap. Two applications should be given, at intervals of a week or ten days.

Strength (*b*).—Two-and-a-half lb. of soft soap are dissolved in 49 gal. water, and into this soap solution 1 gal. of stock solution of A.P.S., 1918, is mixed by stirring. In this manner 50 gal. of wash are prepared, ready for use, containing 0·5 per cent. of soft soap. One application should be sufficient.

Both the above diluted washes must be applied *as soon as made.* It is absolutely necessary to use the soap solution with the wash, as otherwise the mildew-patches are not properly wetted. Where the water is very hard, twice the amount of soap given above should be used.

It will be obvious from the above that the stock solution is not of a kind which growers can make for themselves, and the

point must be emphasised that since it cannot be practically tested by the grower, it should be purchased only from firms of repute who will vouch that it has been prepared according to the methods described above and that it contains the essential ingredients in the proportions given.

Transport.—The means adopted for the transport of the stock solution and the precautions to be taken when handling it should be in every way identical with those adopted in the case of lime-sulphur.

Application. — In applying the ammonium polysulphide and soft-soap solution as a summer wash, a nozzle giving a very fine, " misty " spray should be used. The receptacle used in spraying must be wooden or iron (galvanised iron or tin). A copper knapsack sprayer must not be used, because, just as in the case of the lime-sulphur wash, the dissolved sulphur acts on this metal.

All insecticidal substances which can be added to the lime-sulphur wash, such as arsenate of lead or nicotine, may, if required, be added to the ammonium polysulphide solution.

In dealing with American Gooseberry Mildew, the lime-sulphur wash may be used for the early sprayings, as this wash has now been proved to be thoroughly reliable in dealing with this mildew. When the use of lime-sulphur interferes with the marketing of the berries, the ammonium polysulphide and soft-soap wash should be used. Since some varieties of gooseberries are liable to be injured when sprayed with sulphur-containing washes, the first application should always be on an experimental scale.

Seed Mixtures for Land affected by Clover Sickness.

Owing to the high cost of nitrogenous fertilisers, farmers should endeavour to conserve nitrogen by every means possible. Leguminous plants should, therefore, take a prominent place in every rotation. It is well known that in many districts Red Clover is liable to become " clover sick " if sown on the same field at too short intervals. It is probable that none of the leguminous forage plants are absolutely safe from attacks of "clover sickness," but it is evident that Red Clover is the most susceptible. Peas or beans, both valuable crops under existing conditions, could with advantage be introduced into the rotation on land that is known to be " sick " provided that it is at the same time suitable for the production of these crops

while in the formation of rotation leys, plants other than Red Clover should be used on " sick " land ; or a mixture consisting only partially of Red Clover should replace large seedings of Red Clover by itself. Alsike Clover, White Clover and Trefoil do not suffer from " clover sickness " to nearly the same extent as Red Clover, and may, therefore, be used as substitutes for Red Clover.

Moreover, there is reason to believe that English-grown Late-flowering Red Clover in particular and also Broad Red Clover, from seed harvested in England, are less susceptible to " clover sickness " than imported Clover. When, therefore, Red Clover is used at all in mixtures for " sick " land it is desirable that every endeavour should be made to secure home-grown stocks of seed for the purpose. On chalky soils, or in regions of comparatively low rainfall, Trefoil may be largely used, while in districts of high rainfall more reliance should be placed on Alsike Clover. The following mixtures are suggested :—

One Year Leys.—

Chalky Soils or Low Rainfall.	*lb. per acre.*			*lb. per acre.*	*High Rainfall.*	*lb. per acre.*
Red Clover ..	4	or	Alsike Clover ..	4	Red Clover ..	4
Alsike Clover ..	6		Trefoil ..	12	Alsike Clover .	8
Trefoil	6					

It appears also from experiments conducted in Yorkshire and from experience elsewhere that Red Clover grown in conjunction with Rye-grass is less susceptible to sickness than when grown pure ; in districts adapted for growing mixed " seeds " the Clovers might be decreased to half the above quantities and a ⅛-bush. of Italian Rye-grass added to the mixture.

Two Year Leys. — White Clover should be more largely relied upon in mixtures for two-year leys, in which mixtures both Italian and Perennial Rye-grasses would also take a prominent place.

Low Rainfall.	*lb. per acre.*	*High Rainfall.*	*lb. per acre.*
Red Clover	2	Red Clover	2
Alsike Clover	3	Alsike Clover	4
White Clover	2	White Clover	2
Trefoil	3	Italian Rye-grass ..	6
Italian Rye-grass ..	6	Perennial Rye-grass ..	4
Perennial Rye-grass ..	4		

On soils where Giant Sainfoin is known to succeed, especially where it has not been grown for a number of years, this crop

sown pure might usefully replace Red Clover on "sick" land, whilst the value of Lucerne on soils that suit it must, in this connection, be strongly emphasised. The Vetch is another valuable leguminous plant which, as well as providing nitrogenous residues for the benefit of subsequent crops in the rotation, has a special value at present from the point of view of adding to the diminished supplies of hay.

(*This Article is also issued as Food Production Leaflet No. 61.*)

Notes on Manures for April:
From the Rothamsted Experimental Station, Harpenden, Herts.

Top Dressing for Cereals.—Farmers who have not yet applied top dressings to their cereal crops should look over their fields carefully with a view to giving early dressings wherever necessary. The earlier the top dressing is put on the better: one of the reasons why crops in the past have not benefited from spring dressings as much as might have been expected is that the application has been delayed till they had already begun to suffer from want of help. The proper time to use spring dressings is before the plant shows signs of suffering, and this involves an intelligent appreciation of the conditions to which it has been subjected, and the way in which it is likely to behave when it starts growth.

Ammonium Nitrate as Top Dressing.* — The Ministry of Munitions is offering ammonium nitrate at £25 per ton; this is therefore, the cheapest nitrogenous fertiliser on the market, the nitrogen working out at 14*s.* 4*d.* per unit—a price equivalent to sulphate of ammonia at £14 6*s.* 8*d.* per ton, and to nitrate of soda at £11 9*s.* per ton—figures which are considerably below present prices.

A suitable dressing is ½ cwt. per acre; this quantity is not, however, easily applied by any ordinary manurial drill. The bulk must, therefore, be doubled by mixing it with dry earth or ashes, or if need be with dry superphosphate; basic slag, however, must not be used as it would cause loss of ammonia.

Superphosphate as a Constituent of Top Dressings.—Superphosphate can advantageously be used as a top dressing to cereals where the corn has lain wet for some time, and where, therefore, root action has been delayed. It has the useful property of

* See note on p. 1515 of this *Journal*.

helping the young roots to develop, thereby enabling the plant to make an earlier start than would otherwise be possible. The plant also ripens earlier—a great advantage in wet districts. A suitable dressing is usually about 2 cwt. per acre. In most cases a nitrogenous dressing, such as nitrate of soda, nitrate of ammonia, or sulphate of ammonia, should be given at the same time.

Superphosphate is also likely to be wanted for corn-growing on land ploughed out of grass last year or two years ago. Usually such land contains insufficient phosphate for the needs of the arable crops: here also a suitable dressing is 2 cwt. per acre, and, in addition, a nitrogenous fertiliser may also be needed.

Superphosphate for Grass Land.—Some farmers are experiencing difficulty in obtaining basic slag for their grass land. It is not anticipated that the difficulty will continue long, as the total output is greater than that of last year, and, indeed, the total deliveries are greater also; but in the meantime farmers who cannot obtain slag, and who know that phosphates are needed for their land, can often use superphosphate instead. It should be given at about half the rate at which slag would be applied.

Land laid up for hay may advantageously receive a nitrogenous dressing in addition—1½ cwt. of sulphate of ammonia or ¾ cwt. of nitrate of ammonia.

Dressings for Potato and Root Crops.—It is now necessary to make arrangements for the supply of artificial fertilisers to the root crop. Two general rules should be borne in mind:

1. Phosphates increase the feeding value of the crop and should, therefore, always be given to swedes, turnips, rape, kohl-rabi and other crops grown for animal consumption.
2. Nitrogenous fertilisers increase the crop, and so long as they are properly used they do not detract from its feeding value: there is no ground for the belief sometimes held that fodder crops grown with artificial manures are necessarily unsatisfactory from the feeding point of view.

A suitable dressing for the above *fodder crops* grown for sheep or cattle would be 2½ to 4 cwt. of superphosphate and 1 cwt. of nitrate of soda or sulphate of ammonia or ¾ cwt. of ammonium nitrate. Even where farmyard manure has been applied, it may prove necessary to give artificial manures to swedes and turnips; the farmer who wishes to make the best of his scheme of manuring should ascertain this point by direct trial

Mangolds can do with both farmyard manure and artificials; they respond to liberal treatment, and it is often an advantage to the dairyman to have a heavy crop in a particular field. They require superphosphate at the rate of 2 to 2½ cwt. per acre to bring them on early, and they can also make good use of nitrogenous manures: from 1 to 2 cwt. of sulphate of ammonia or nitrate of soda can be used, or ¾ to 1 cwt. of nitrate of ammonia. In addition, mangolds respond to salt in quantities of 2 to 4 cwt. per acre: salt should not be omitted, as it helps to economise the supplies of potash which must now be somewhat depleted in some of our own soils.

Potatoes also respond to both farmyard manure and artificials. They can advantageously receive more superphosphate than would be given to mangolds: a suitable dressing would be 2½ to 4 cwt. per acre. Potatoes do not need so much nitrogenous manure as mangolds: if given too much nitrogen they are apt to produce excessive tops. About 1 cwt. of sulphate of ammonia would commonly suffice, though the amount varies in different districts, and growers must be guided by good local practice. Potash is also required, and it is hoped that supplies will be available in sufficient quantity to meet all demands.

Land Drainage.

CAMBRIDGESHIRE is a county in which much drainage work is necessary, and the Executive Committee of the War Agricultural Committee, realising the importance of improving the waterways throughout the county, have been very active during the last two years. A brief review of the drainage work carried out by the Committee may be of interest.

In November, 1917, a small prisoner camp was established at Meldreth, and by August, 1918, the Mel, a stream 2 to 3 miles in length, was scoured and cleansed. Overhanging and unsound trees were removed from the water's edge, and the banks were repaired. It was found possible to dam and by-pass the water during the summer months; and the accumulation of mud was thrown or wheeled out in barrows. This work was carried out under Orders issued on frontage occupiers under the Defence of the Realm Regulations.

Early in 1918, at the request of a number of owners and occupiers, the Committee took in hand the improvement of Isleham Fen, an area of about 3,500 acres with a variety

of fen soils. There are about 100 occupiers of land within the area; and a portion of the Fen is market-garden land. The Fen lies at a height varying from 1 to 12 ft. above sea level. Portions of the Fen have been lowered by paring and burning, and by digging for fuel.

The Board of Agriculture, at the suggestion of the County Executive Committee, issued an Order in June last prohibiting the paring and burning of Fen land in Cambridgeshire, except with the permission of the Committee. A survey of the Fen was made and levels were taken. The work is now (February, 1919), after 10 months, nearing completion. Some 11 miles of main drains, with a top width varying from 9 to 14 ft., have been opened out, deepened and widened, and the sides given a correct batter. The water in the drains is held up by dams, which are drawn at night. No fewer than 48 gateway tunnels have been fixed in the drains. These are elm trunks of uniform size, no other form of tunnel having been found to be suitable in Fen land. A number of these tunnels are supplied with slats which fix into a frame in order to hold up water for stock in dry weather. The Fen is approached by a number of wide parallel Fen droves, on either side of which are usually found the main drains. The droves are common for stock grazing, and a number of drinking-places have been made and fenced off from the drains.

For the drainage of the Fen it has been found necessary to open an old catchwater drain on the edge of the Fen. In its course through a gravel hill the sides had slipped in and the drain was overgrown, and for many years the upland water had flowed into the Fen instead of being conveyed along its edge by the catchwater drain. Now that the old catchwater has been opened the Fen land will be relieved of this water and only in times of drought will water be passed into the Fen from the catchwater.

There still remains to be dealt with an area of about 300 acres at the northern and lower end of the Fen. For the drainage of this area it will be necessary to erect a small pumping station to lift the water into the main drain, which is carried across the area at high level and is ultimately raised into the River Lark by the pumping station at Prickwillow.

Questions in Parliament affecting Agriculture.

Tenure of Allotments.*—*Mr. T. Griffiths* asked the President of the Local Government Board whether he will consider the advisability of taking steps to secure fixity of tenure for allotment holders, and to make it obligatory upon local authorities to provide land for allotments at fair rents ?

Sir A. Griffith-Boscawen : The Board cannot undertake to secure fixity of tenure for allotment holders in view of the fact that the land may be required for building in the near future. As regards land taken under the D.O.R.A. Regulations the Board intend to retain possession for two years after the end of the War, except where the land is required for building or where the compensation payable would be excessive. With regard to the second part of the question, local authorities are already charged with the statutory duty of providing allotments, and it is proposed to extend their powers of acquiring land for this purpose in the Land Settlement (Facilities) Bill. (18th February.)

Sir Kingsley Wood asked the Parliamentary Secretary to the Board of Agriculture whether the Board investigates each case where an allotment holder receives notice to quit his allotment under the Cultivation of Lands Order ; whether in each case it must be proved that the land is required for a better purpose than food production before it is released from the obligations of the Order ; whether he will make representations to the local authorities that allotment holders under the Order should be permitted to cultivate the land until it is actually required for some more necessary public purpose than food production ; and whether, in the event of an allotment holder being dispossessed, he will impress on local authorities the necessity of the dispossessed holders being provided with an equivalent amount of suitable land wherever possible ?

Sir A. Griffith-Boscawen : The Board cannot undertake to investigate each case, but the local authorities who administer the Order have been informed by the Board of the course they should adopt. As regards the latter portion of the question, it is the statutory duty of the local authorities to provide land to meet the demand for allotments, but in urban areas there is often not sufficient land available to provide for all the applicants. (27th February, 1919.)

Wheat.—*Colonel Wedgwood* asked the Prime Minister why, while the law guarantees a price of 55*s.* a qr., His Majesty's Government is in fact guaranteeing a price of 75*s.* 6*d.* a qr. ; and whether His Majesty's Government are putting any obstacles in the way of the importation of cheap corn into the country ?

Sir A. Griffith-Boscawen : The price of the 1919 wheat crop represents the considered opinion of the late Government on the price that would be necessary in 1919 to induce the farmers to grow wheat as extensively as in 1918. I am informed that His Majesty's Government is selling imported wheat and flour to the public at less than cost price. Fifty-five shillings per qr. in the Corn Production Act is calculated on a qr. of 480 lb. The 75*s.* 6*d.* mentioned by the hon. and gallant Member is based on the qr. of 504 lb. The corresponding figure, is therefore, 72*s.* (21st February.)

Wheat Prices.—*Mr. Cautley* asked the Parliamentary Secretary to the Board of Agriculture (1) whether he can now announce the steps the

* See also p. 1520.

Government are taking to ensure to farmers a market at the present controlled price for the 1918 wheat which they were compelled to grow;

(2) whether, in consequence of the millers being filled up with the foreign wheat which he has put on the market, farmers are unable to sell the 1918 wheat which they were compelled to grow, or sell it at prices from 5*s.* to 8*s.* below the present controlled price; whether this is causing great hardship; and whether he can see his way to temporarily keep back foreign wheat, or to order that millers shall mix with it a fixed percentage of English wheat, or take some other steps to enable farmers to sell their 1918 wheat at the present controlled price?

Mr. McCurdy: I have been asked to reply, and will answer these questions together. On the average, approximately 30 per cent. of home-grown wheat is being used in all the mills in the United Kingdom at the present moment, and at this rate all the wheat grown will be required in due course. The present controlled price, *i.e.*, maximum price, a mean of 76*s.*, is considerably in excess of the price guaranteed by Statute to the 1918 harvest, namely, 55*s.* per qr. of 480 lb., or 57*s.* 9*d.* per 504 lb., the latter being the weight fixed for maximum prices applicable to the 1918 crop.

Mr. Cautley asked the Parliamentary Secretary to the Board of Agriculture when he will be able to make a statement of the Government's policy as to the price for 1920 wheat; and whether he will bear in mind that such statement should be made in the next two or three weeks so as to enable farmers to decide how much, if any, land they will set aside for fallowing and preparing for wheat to be sown next autumn?

Sir A. Griffith-Boscawen: The only guarantee that can be given at present is that provided for in Section 2 (1) of the Corn Production Act, 1917. (3rd March, 1919.)

Ploughing Orders.—*Mr. Wilson-Fox* asked the Parliamentary Secretary to the Board of Agriculture whether he is aware that Orders for the ploughing up of grass land are still being given by Agricultural Committees; and why this action is being taken at a time when the supply of corn available or in sight is generally understood to be ample for the requirements of the country?

Sir A. Griffith-Boscawen: It is still in the national interest that as much land as possible in this country should be kept and brought under the plough, in view of the probable demand of other countries on the exportable surplus of the world. The need for increased production remains, and the Board have, therefore, informed the Agricultural Executive Committees that, while it is impracticable at present to compel farmers generally to plough more grass land, orders may be issued in special cases. I may remind my hon. Friend that all ploughing Orders are now subject to a right of appeal to an independent arbitrator. The policy of the Board on the matter is set out in a Circular Letter issued by the President on the 1st instant.*

Captain Terrell asked the Parliamentary Secretary to the Board of Agriculture, what steps he proposes to take to ensure that the land ploughed up during the War is not allowed to revert to grass?

Sir A. Griffith-Boscawen: Agricultural Executive Committees are authorised by Regulations issued under the Defence of the Realm Act to maintain in arable cultivation any grass land which has been ploughed up. (13th February.)

* Printed in this *Journal*, February, 1919, p. 1359.

Major Wheler asked the Parliamentary Secretary to the Board o Agriculture whether the Board had received in December a resolutio passed by the Council of the Central Chamber of Agriculture protestin against the attitude taken up by the Food Production Department c the Board in cases of a change of tenancy by refusing to recognise th right of the incoming tenant to compensation for loss of crop on lan ploughed out by Order on the ground that the Order to plough out wa served on the outgoing tenant; and, if so, what action the Board hav taken to remedy this injustice to the incoming tenant?

Sir A. Griffith-Boscawen: The Board received the resolutio referred to. The right of the incoming tenant depends on varyin circumstances which cannot be set out in the limits of an answer. Th position of the Board is stated fully in a letter which they have sent t the Royal Agricultural Society.

Mr. Lambert asked the Parliamentary Secretary to the Board o Agriculture whether compensation will be available to cultivators o land who, by the Order of the County Executive Committee, plougher and cropped unsuitable land, losing heavily in the process last year?

Sir A. Griffith-Boscawen: Yes, Sir. The Board are liable to pa compensation to any person who suffers any such loss by reason of th exercise of the powers of any executive committee.

Mr. Lambert: To whom should application be made in these cases

Sir A. Griffith-Boscawen: It should be made to the Board. (18t February.)

Market Gardeners' Produce.—*Mr. Gwynne* asked the Parliamentar Secretary to the Board of Agriculture whether, seeing that marke gardeners are paying the increased wages as provided by the Cor Production Act to their workmen, he will state what steps are to b taken to secure them a fair price for their produce; and if it is intende in the near future to take steps to prevent the dumping of foreign-grow produce in this country?

Sir A. Griffith-Boscawen: The Board are considering what step can be taken to improve the system of marketing fruit and vegetables I am not in a position at present to answer the second part of th question.

Mr. Gwynne: Is the Board considering the second part of th question?

Sir A. Griffith-Boscawen: It is part of a much larger question whic affects not only the question of fruit, but other imports, and the matte is being considered by the Government. (18th February.)

Home-grown Fruit and Vegetables.—*Mr. Gwynne* asked the Parlia mentary Secretary to the Board of Agriculture whether, in view of th probability of the dumping of foreign fruit and vegetables in this country he will take steps to arrange for preferential rates for fruit and market garden produce grown in this country?

Sir A. Griffith-Boscawen: It is not within the powers of the Board t determine railway rates or to arrange for preferential rates for home grown produce, but they will continue their endeavours to ensur equitable treatment for British growers. (18th February.)

Potatoes.—In reply to *Lieut.-Col. Weigall, Mr. McCurdy* said: Th Food Controller has received representations from various agricultura organisations throughout the United Kingdom concerning the remova of potato crops which is proceeding as quickly as possible. I may poin

out that a large surplus crop of potatoes has been grown in the United Kingdom generally, and that, in view of the Armistice, there has of necessity been a reduction in the demand. Every effort is being made by the Ministry to obtain markets abroad to enable stocks of potatoes in the growers' hands to be disposed of as quickly as possible. Instructions have been issued through the Potato Control Committees as to the procedure for making claims in respect of abnormal wastage of potatoes which have been put in the clamps in sound condition. I am aware that owing to the prevalence of blight in the crop this year, particularly in the Eastern Counties, considerable damage may have accrued. (18th February.)

Mr. John Dennis asked (*a*) if one of the conditions under which farmers were asked to meet an urgent national situation by extending their potato acreage in 1918 was that after 1st November of that year the Ministry of Food would bear the risk of damage other than normal wastage; and (*b*) whether officials of the Ministry throughout the country, to encourage producers, defined abnormal wastage as being all wastage other than loss of weight through evaporation?

Mr. Roberts: The answer to the first part of the question is in the affirmative, and to the second part in the negative. The conditions under which the Food Controller will accept claims for abnormal wastage are set out in the first note to the Schedule of the Report of the Joint Commission appointed on 19th July, 1918, by the President of the Board of Agriculture and Fisheries and the Food Controller, for the purpose of fixing prices to be paid to growers of potatoes in England and Wales.* The note reads as follows: (*a*) "The increments fixed in the above schedule must be accepted as covering compensation to the grower for wastage and loss, in pits and for deferred delivery. Price, weight, and condition are to be determined in accordance with the scale set out above as at the date when delivery is taken. No grower is entitled to claim further compensation for any losses save those which are quite exceptional in character. In such cases it will be the duty of the grower, when making application for compensation, to satisfy the Government that (1) the site of the pit has been properly chosen; (2) the potatoes were in sound condition when pitted; and (3) due care was exercised in constructing the pits and in examining the condition of their contents from time to time." (19th February.)

Answering *Mr. John Dennis*, *Mr. McCurdy* said: The Food Controller is aware that, as a result of blight, the quantity of unsound potatoes in the clamps is in excess of the normal; and is certainly of the opinion that these potatoes should be used for cattle feeding where possible. There is nothing to prevent the farmer from at once selling unsound potatoes or using them for his cattle, and in order to avoid any misunderstanding I will have a further notice issued to farmers on this subject. I may add that the question whether the farmer has a claim against the Ministry for abnormal wastage will be settled by the Ministry in each case. (20th February.)

Mr. McCurdy added in reply to *Captain Coote*: The policy of the Ministry of Food in regard to potatoes is to reduce the surplus throughout the country as quickly as possible, and large quantities of potatoes are being exported to France and other destinations. If the hon. Member will be good enough to give particulars of any case in which great

* See this *Journal*, December, 1918, p. 1116.

hardship is being caused to a small holder, I will have inquiries made. (20th February.)

Wart Disease of Potatoes.—*Commander N. Craig* asked the Parliamentary Secretary to the Board of Agriculture whether, until the year 1918, the potato crops in the county of Kent had heen free from Wart Disease; whether, in the year 1918, no less than eight centres in Kent were found to be affected with this disease; whether the soil in certain districts in the Midlands, in the North of England, and in Scotland has become so infected that the cultivation of heavy cropping varieties of potatoes is being abandoned; whether the curative or protective measures of the Board have hitherto consisted in the planting of immune varieties of potatoes or some other arable crop; whether varieties of potatoes, themselves immune, may convey, and whether the soil in which they are grown may convey, Wart Disease; whether infection in the county of Kent has been traced to a consignment of four tons of Scottish Arran Chief seed potatoes found to be affected badly with Wart Disease; whether other, and how many other, consignments of Scottish seed have been found in 1918 on inspection to be diseased; and whether he will take necessary and effective measures to prevent seed potatoes from northern districts being sent into the South of England?

Sir A. Griffith-Boscawen: Wart Disease was first reported among the potato crops in Kent in 1914. Eight cases were reported in 1918—including one case in the administrative county of London. In certain districts in the North of England the planting of susceptible varieties has been prohibited, but the approved immune varieties that are allowed to be planted in these areas include some of the heaviest cropping varieties under cultivation.

The chief protective measure adopted by the Board consists in encouraging, and in scheduled areas enforcing, the growth of immune varieties, and this has proved eminently successful. The disease may be conveyed from one area to another either through the "seed" or through the soil, but the Board have no information which would lead them to believe that the appearance of disease in any district may be attributed either to the importation of diseased soil or to the planting of "immune" varieties.

As regards movement from the infected areas of the North of England under the Wart Disease of Potatoes Order of 1918, the planting of potatoes grown in an infected area is prohibited except in that or in another infected area. In several cases infection has been traced to "seed" imported from Scotland, especially of the "Arran Chief" variety, and the Board have under consideration the issue of an Order prohibiting the movement into England and Wales of "seed" of the susceptible varieties from Scotland without due safeguards.

Army Mares.—*Captain Sir B. Stanier* asked the Parliamentary Secretary to the Board of Agriculture whether half-legged mares are now being issued to farmers; and how many are now out, and how many there are ready to go out?

Sir A. Griffith-Boscawen: Surplus Army mares of light-draught types are being issued to farmers and others for breeding purposes on prescribed conditions. Sixty-eight of light-draught type have been allotted to agricultural executive committees for issue. Twenty others of light-draught type have been selected as suitable and will be issued at an early date. (14th February, 1919.)

Milk.—*Captain R. Terrell* asked the Prime Minister whether the :abinet have taken into consideration the question of the control by the State of the milk supply; and, if so, whether, before arriving at any lecision, he proposes to hear the views of those more especially nterested?

Mr. McCurdy: I have been asked to reply. The answer to the first part of the question is in the negative. The Food Controller is arranging hat the question of future control shall be considered in the first instance y an interdepartmental Conference comprising representatives of the Iinistry of Food, the Local Government Boards, and the Departments f Agriculture. Legislation will, of course, be necessary before State ontrol of the milk supply can come into effect, and full opportunity for iscussion will be given. (20th February, 1919.)

Definition of "Market Gardener."—*Captain Reginald Terrell* asked le Parliamentary Secretary to the Board of Agriculture what is the efinition, as accepted by the Agricultural Wages Board, of a market ardener; and how are the wages of men defined when the employer arries on with the same staff the joint business of farming and market ardening?

Sir A. Griffith-Boscawen: The Agricultural Wages Board have not nally accepted a definition of a market gardener. They have published notice of proposal to fix a differential minimum rate of wages for orkmen of 21 years and over in Essex, who are employed wholly or ainly in connection with the use of land for a market garden, by an nployer who is engaged in the trade or business of market gardening. ny objection to this proposal may be lodged before the 4th March ext. After that date the Agricultural Wages Board will consider all ojections and decide whether an Order shall be made on the subject; id, if so, in what terms. (21st February.)

Land Settlement of Ex-Service Men.—*Sir Richard Cooper* asked the arliamentary Secretary to the Board of Agriculture if he will say how any ex-Service men have actually been settled on the land under rangements made by the Board; for what number arrangements are negotiation; and how many are pursuing courses of training with ssistance from the Government, with a view to their taking up positions agriculture or allied occupations?

Sir A. Griffith-Boscawen: The settlement of ex-Service men on the nd is being carried on mainly through the county councils and it is ot possible therefore to answer the several points raised by the hon. aronet.

The Board have established four colonies on which about 65 men e being employed with a view to subsequent settlement; and they ive approved of over 200 officers for training with selected farmers. ourses of training have been started through the Ministry of Pensions d the Board, but it is not possible to give precise numbers of the personnel being so trained. As regards the acquisition of land, the Board id the councils are actively engaged in acquiring any suitable land that available for the purpose in view. (3rd March, 1919.)

Agricultural Training for Ex-Officers.—*Mr. Cautley* asked the arliamentary Secretary to the Board of Agriculture what financial sistance will be given by the Board to ex-officers of the Army, Navy, d Air Force desiring to be trained in agriculture for such posts as icers of the Board, county officials, estate agents, and managers; d what are the prospects of such employment being available?

Sir A. Griffith-Boscawen: The Board have obtained authority to award fifty scholarships, of a value varying up to £175 per annum and fees, to be held at universities and agricultural colleges to ex-officers and men of educational promise wishing to take up a career of the nature indicated by the hon. Member, and they are prepared, subject to Treasury approval, to increase this number up to 100 if necessary. These scholarships are intended for candidates who have some previous scientific knowledge, or practical training, or both. Particulars are given in a booklet, entitled "Land Settlement in the Mother Country—Officers," which has been widely circulated.* Appointments cannot, of course, be guaranteed at the end of training, and the Board are strongly of opinion that the number of posts—official and other—likely to be available does not justify them in encouraging more than a small number of ex-officers or men to seek a career in this direction. I am glad of an opportunity to make this public statement, as very many applications and inquiries for salaried appointments in agriculture are now being received, and it is most desirable that it should be known at once that openings of the kind are bound to be comparatively few. (13th February.)

Entertainments Duty and Agricultural Shows.—*Colonel M. J. Wilson* asked the Parliamentary Secretary to the Board of Agriculture whether he is aware that, owing to the incidence of the Entertainments Tax, it is proposed to abandon many of the local produce and agricultural shows for this year; and whether, in view of the advantage of holding these shows, he can make any statement on the matter?

Sir A. Griffith-Boscawen: The Commissioners of Customs and Excise have informed the Board that they have no power to exempt an agricultural show from the Entertainments Tax, except under Section 1 (5) (*d*) of the Act, which requires them to be satisfied that it is provided for partly educational or partly scientific purposes by a society not conducted or established for profit.

In estimating the title of any particular show to exemption under this provision, they will have regard to the nature of the show as a whole, and their decision will largely turn on whether the show is confined to exhibitions of a partly educational character, or whether it comprises elements of a nature designed to afford amusement rather than education, and to attract the general public rather than persons interested in the study or the practice of agriculture.

The managers of an agricultural show should apply to the Customs and Excise Department for exemption from the Entertainments Tax, furnishing with the application a programme of the show, stating whether music, sports, and other extraneous amusements will be included in the proceedings, and also sending a financial statement showing whether the society is conducted for profit, together with a copy of the rules.

Mr. Pretyman: Is my hon. Friend aware that it is not only the sums paid for entrance, but the annual subscription on which these shows depend, and will he look into the question from that point of view?

Sir A. Griffith-Boscawen: It is really a matter for the Customs to decide.

Colonel Weigall: Who is to decide whether a show is educational?

Sir A. Griffith-Boscawen: I should like notice of that. (3rd March, 1919.)

* A *résumé* of this booklet appeared in this *Journal*, February, 1919, p. 1311.

Forestry.—*Major Lane-Fox* asked the Prime Minister whether he is aware of the need for the prompt setting up of the new forestry authority, in view of the probable shortage of seedlings in the near future and the acreage of recently felled woodlands which will require replanting; and whether any steps are now being taken to provide for that shortage, in view of the delay in setting up that authority due to the need for special legislation?

Mr. Bonar Law: I am aware of the desirability of early legislation on the subject of forestry. The Interim Forest Authority are authorised to acquire seeds and to arrange for their planting, and they are taking active steps in this direction. Unfortunately, seed supplies are very short, as last autumn was extremely unfavourable both here and abroad for bringing seeds to maturity.

Major Lane-Fox: Can the right hon. Gentleman tell us when this legislation is likely to be introduced, in view of the urgency of the question?

Mr. Bonar Law: Yes; in the immediate future

Colonel Yate: Will steps be taken to establish a regular school of forestry in this country?

Mr. Bonar Law: Legislation on this subject is now being prepared, and I hope will be introduced in the immediate future. (28th February, 1919.)

Reconstruction of the Board of Agriculture.—*Lieut.-Col. Weigall* asked the Prime Minister whether, as a necessary preliminary to carrying out agricultural reconstruction and rural regeneration as outlined in his speeches on the 16th November, 1918, the 23rd November, 1918, and 7th December, 1918, it is proposed to reorganise the Board of Agriculture in order that it may have the status, staff, and accommodation necessary to effectively administer and control; and, in particular, whether the eleven separate offices now under the Department can be centralised in one building in the interests of efficiency and economy?

Sir A. Griffith-Boscawen: I have been asked to answer this question. The answer to the first part of the question is in the affirmative, and various proposals are being placed before the Treasury. The position as regards the Board's office accommodation is undoubtedy serious. There are 19 separate offices, not 11 as stated by the hon. Member. My Noble Friend has made representations to the Government on the subject.

OFFICIAL NOTICES AND CIRCULARS.

N.B.—The Orders which may be mentioned in this section of the JOURNAL *may usually be obtained at the price of 1d. each from H.M. Stationery Office, Imperial House, Kingsway, London, W.C. 2, and 28, Abingdon Street, London, S.W. 1; 37, Peter Street, Manchester, and 1, St. Andrew's Crescent, Cardiff.*

Cereals Prices for the 1919 Crop.

IT was stated in an announcement made by the Joint Committee for the Board of Agriculture and the Ministry of Food on 26th February, that the Board of Agriculture and Fisheries have again had before them the question of the prices to be paid to farmers for controlled cereals harvested in 1919. As the matter stands, the War Cabinet, on the 19th November last, have authorised

the statement that farmers would obtain for such cereals not less than the prices "now current." The Board are, however, not yet in a position to state precisely in what manner the promise given on behalf of the Government will be carried out, a matter which is under consideration at the present time.

Order Amending the Grain Prices Order, 1918.

AN Order (No. 161) dated 14th February, 1919, has been made by the Food Controller, amending the Grain (Prices) Order, 1918,* as follows:—

1. Clause 11 of the Principal Order shall be deleted and the following Clause shall be substituted therefor—

"11. (*a*) A person shall not sell or offer to sell any wheat, rye, oats or barley, whether imported or home grown, which has been torrefied or bleached, otherwise than by weight, or at prices exceeding the maximum prices, if any, applicable under the provisions of this Clause.

(*b*) Upon the occasion of a sale of any such wheat, rye, oats or barley the maximum price shall be ascertained—

(i.) In the case of wheat, rye, oats or barley harvested in the United Kingdom, by adding to the price applicable to wheat, rye, oats or barley under this Order the cost of such torrefying or bleaching not exceeding a usual and reasonable charge.

(ii.) In the case of damaged imported wheat, rye, oats or barley, by adding to the price applicable thereto according to the provisions of the Damaged Grain, Seeds and Pulse (Prices) Order, 1917, as amended† the cost of such torrefying or bleaching not exceeding a usual and reasonable charge."

Amended Prices for Peas, Beans, Maize and Oats.

THE following announcement was made by the Ministry of Food on 3rd March:—

The Royal Commission on Wheat Supplies announce the following alterations in their selling prices, to take effect as from 17th March, 1919, for consumption in the United Kingdom only:—

	Present Prices.	*Future Prices.*
Peas, blue and green	£66 15*s*.	£48 15*s*. per ton, *ex* store.
Beans—		
Butter	£58 15*s*.	£40 15*s*. ,, ,,
White haricot ..	£40 15*s*.	£20 ,, ,,
Coloured ,, ..	£35	£20 ,, ,,
Maize—		
Argentine ..	£3 10*s*.	£3 per 480 lb. c.i.f.
American ..	£3 15*s*.	£3 ,, ,,
South African ..	£3 15*s*.	£3 5*s*. ,, ,,
Maize Meal ..	£22 10*s*.	£20 per ton *ex* store.
Oats—		
Irish	£2 16*s*.	£2 10*s*. per 320 lb. *ex* store.

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* Printed in this *Journal*, September, 1918, p. 742.
† See this *Journal*, December, 1917, p. 1026, and June, 1918, p. 346.

THE following Press Notice was issued by the Ministry of Food on 5th March :—

Order Prohibiting Consignment of Potatoes from Kent to London.

In view of the fact that the surplus of potatoes in Kent has now been absorbed, the Food Controller has revoked as from the 10th March, 1919, the general licence by which potatoes were allowed to be moved or consigned from the Kent (zonal) area to the London (postal) area. On and after that date no potatoes will be allowed to be moved from Kent to London, except where they are carted to London, and the distance from the farm to the place of delivery does not exceed five miles.

The movement and consignment of potatoes from the Kent area to the zonal area P.O. 8, comprising Surrey (outside London postal area) and Sussex, is however still permitted by general licence.

THE Food Controller has made an Order (No. 120), dated 7th February, 1919, ordering that on and from 10th February, 1919, the Cattle Feeding Stuffs (Maximum Prices) Order, 1918,* shall be amended as follows :—

Order Amending the Cattle Feeding Stuffs (Maximum Prices) Order, 1918.

1. Sub-clause (iii.) of Clause 3 shall be deleted and the following Sub-clause shall be substituted :—

(iii.) (*a*) Where on a sale of millers' offals such quantity is less than 1 cwt., but more than 28 lb., and the bulk is broken, a sum at the rate of ¼*d*. per lb.

(*b*) Where on a sale of millers' offals such quantity is 28 lb. or less, and the bulk is broken, a sum at the rate of ½*d*. per lb.

(*c*) Where on a sale of any other cattle feeding stuffs such quantity is less than 1 cwt. and the bulk is broken, a sum at the rate of ¼*d*. per lb.

2. Clause 6 of the Principal Order shall be deleted, and the following Clause shall be substituted :—

(*a*) Except as provided with reference to millers' offals in paragraph (*b*) of this Clause, all cattle feeding stuffs for which a maximum price is prescribed by this Order, whether imported or made or produced in the British Islands, shall, if sold in sacks or bags, be sold gross weight, sacks or bags included, and in the case of cattle feeding stuffs made or produced in the British Islands such charges in respect of sacks or bags as the Food Controller may from time to time by notice prescribe may be added to the maximum prices prescribed by this Order. Until further notice, the prescribed charges in respect of sacks or bags shall be :—

(i.) On a sale of cake or meal a charge at the rate of 25*s*. per ton if sold in 20 sacks or bags to the ton, and so in proportion according to the number of sacks or bags used per ton.

* Printed in this *Journal*, March, 1918, p. 1474.

(ii.) On a sale of millers' offals a charge at the rate of 25*s.* per ton if sold in sacks or bags containing 1 cwt. or less and 20*s.* per ton if sold in sacks or bags containing more than 1 cwt.

(iii.) On a sale of any other cattle feeding stuffs a charge at the rate of 25*s.* per ton if sold in 20 sacks or bags to the ton, and so in proportion according to the number of sacks or bags used per ton.

Provided that in any of the foregoing cases the buyer may by arrangement with the seller send his own sacks or bags to be filled, in which event the cattle feeding stuffs shall be sold net weight, sacks or bags excluded, and in that event no charge shall be added under this Clause to the maximum price.

(*b*) (i.) On a sale of millers' offals produced in the British Islands, and sold in sacks or bags bearing a miller's name or trade mark, the seller may at his option, notwithstanding anything in paragraph (*a*) of this Clause, sell net weight, sacks or bags excluded, and make a charge at the rate of 2*s.* 6*d.* per sack or bag, in which event the charge shall be shown as a separate item on the invoice and be repaid on the return within three months of the date of invoice of any sack or bag which bears the same name or trade mark and is in good condition.

(ii.) On a sale of imported millers' offals sold in sacks or bags the seller may make a charge for such sacks or bags at the rate permitted by Sub-clause (*a*) (ii.) of this Clause.

4. In paragraph (*b*) of Clause 17 of the Principal Order the word "article" shall be deleted and the words "cattle feeding stuffs" shall be substituted.

THE following Press Notice was issued by the Ministry of Food on 27th February :—

Distribution of Cattle Feeding Stuffs.

The supplies of cattle feeding stuffs that will be available for consumption before the end of the winter feeding season are estimated to be sufficient for the needs of live stock at the present rate of consumption, and the Food Controller accordingly does not propose, after 15th March, to issue any further certificates for oil cakes and meals. Dealers need not accept any certificates that have not been deposited with them before the 1st April, nor are they bound to fulfil any orders under certificates deposited with them before 1st April unless such orders have been given before 15th April.

Farmers and others may purchase supplies freely wherever they are available, but whenever supplies are not equal to all the demands purchasers requiring supplies for milch cows will be given a preference.

Supplies of linseed cake are temporarily not equal to the demands for that variety, and while makers will distribute them as equally as possible, farmers should, whenever necessary, use the other varieties that are purchaseable.

Increased Prices for Cattle.

THE following tables on the sale of cattle, replace those published on pp. 1025–7 of this *Journal* for November, 1918 :—

PRICES OF CATTLE PER CWT. LIVE WEIGHT.

Bulls, Bullocks, and Heifers.

	First Grade.	*Second Grade.*	*Third Grade.*	*Fourth Grade.*
	s.	*s.*	*s.*	*s.*
February	80	75	70	55
March	81	76	71	55
April	83	78	73	55
May	85	80	75	55
June	85	80	75	55
July	82	77	72	55
August	79	74	69	55
September	75	70	65	55

Cows.

	First Grade.	*Second Grade.*	*Third Grade.*	*Fourth Grade.*
	s.	*s.*	*s.*	*s.*
February	75	67	58	45
March	76	68	59	45
April	78	70	61	45
May	80	72	63	45
June	80	72	63	45
July	77	69	60	45
August	74	66	57	45
September	70	62	53	45

PRICES OF CATTLE PER LB. DEAD WEIGHT.

(Offals included in sale.)

Month.	Standard Price.	Increase to Farmer.	Total payable to Farmer.
	s. d.	*d.*	*s. d.*
March	1 2¼	1⅛	1 3⅜
April	1 2¼	2	1 4¼
May	1 2¼	2½	1 4¾
June	1 2¼	2½	1 4¾
July	1 2¼	1¾	1 4
August	1 2¼	1	1 3¼
September ..	1 2¼	—	1 2¼

NOTE.—(*a*) Where carcasses only are sold the price is 1*s.* 2¼*d.* per lb.
(*b*) The increases given above *do not apply* to Grade B cattle.

THE following Notice was issued by the Food Production Department of the Board on 7th March :—

Ammonium Nitrate as a Fertiliser.

The Board of Agriculture desire to draw the attention of farmers to the fact that large quantities of ammonium nitrate are now available. Hitherto, the disadvantage of this material for manurial purposes lay in the readiness with which it absorbed moisture from the air, sometimes setting into solid lumps which it was difficult to drill into the land. This difficulty has, however, been overcome, and the material now at disposal may be stored for a considerable period without absorbing moisture, and remains in good condition and quite suitable for drilling. Experiments recently made at Rothamsted show that ammonium nitrate is at least as useful as sulphate of ammonia for wheat and for mangolds. Its fertilising value per ton is nearly twice that of sulphate of ammonia ; consequently a smaller quantity is needed, and its use would result in a considerable saving in respect of carriage and handling. In view of the wet winter, it is probable that in the majority of cases wheat will benefit from a top-dressing of nitrogenous manure, and a dressing of about $\frac{1}{2}$–$\frac{3}{4}$ cwt. per acre of ammonium nitrate might now be applied, mixed, if necessary, with about an equal weight of dry earth to facilitate distribution. Similarly for the production of hay it should be given a trial. The manure may, if desired, be mixed with dry superphosphate immediately before sowing. The Disposal Board is prepared to issue ammonium nitrate for manurial purposes at £25 per ton, f.o.r. store, packages free, and farmers desirous of purchasing should apply to the Secretary, Disposal Board (D.B. 4 C), Ministry of Munitions, Storey's Gate, S.W. 1. Farmers should state that the material is required for use as manure.

THE following Notice was issued by the Food Production Department of the Board on 7th March :—

Prices for Nicotine.

Fruit growers and makers of insecticide washes should note that the manufacturers of nicotine have agreed that the maximum price to be charged for nicotine to the grower or manufacturer of compound washes up to the 30th June next is 16*s*. per lb., 95 to 98 per cent. purity for 100 lb. lots delivered to purchasers nearest railway station, and 16*s*. per lb. f.o.r. for sales of less than 100 lb. lots. Prices of nicotine for lower purity are to be proportionate. Buyers of nicotine are required to give an undertaking in writing, that any nicotine purchased by them will be used solely as an insecticide for their own crops, or else in the manufacture by them of compound washes for re-sale.

THE following Press Notice was issued by the Ministry of Food on 4th March :—

Deputation on Milk Control.

This afternoon the Food Controller received a deputation from the National Federation of Dairymen's Associations, who desired to put before him their views on the future of milk control, especially as affecting distributors. The deputation was introduced by Mr. Reginald Butler of the United Dairies, President of the Federation, who pointed out that they were willing to assist the Food Controller in every possible way, but at the same time wished to have some assurance as to what was going to happen to the dairy trade.

After other speakers had been heard, Mr. Roberts replied to the deputation. He stated that so far no decision had been taken as to the permanent control of the trade, and that any such decision must necessarily be that of the Government and be arrived at after full consideration of all sides of the problem. He emphasised the fact that the quality of milk was a most important matter from the point of view of national welfare, and suggested that much might be done by the trade themselves to bring about an improvement in this respect.

Mr. Roberts promised that careful consideration should be given to a number of detailed points which had been raised by the speakers, in regard especially to the fixing of milk prices, the powers of Food Control Committees and the producer's price for cheese. The deputation expressed themselves as gratified with the sympathetic hearing which Mr. Roberts had given to them.

THE following Press Notice was issued by the Ministry of Food on 3rd March :—

Clean Milk.

The National Clean Milk Society have appointed as demonstators Miss F. M. Westray and Miss C. R. Westray, who have been working as milkers and dairymaids for 3½ years during the War on one of the few farms producing milk that is licensed by the Ministry of Food to sell its product as grade A milk.

Either of these demonstrators is now prepared to visit any farm whose occupier would like to have his employees shown how clean milk can be produced. The Society is anxious to demonstrate that whereas suitable buildings are of great help, clean milk can be produced by anyone who is really determined to produce it, even if the buildings are unsatisfactory, as proper methods are the most important factors. Particulars as to terms, etc., will be given upon application to Mr. J. B. Ferguson (Hon. Sec.), 2, Soho Square, London, W. 1.

THE following Circular Letter was addressed to County Councils and the Councils of County Boroughs in England and Wales by the Food Production Department of the Board on 26th February :—

Land Settlement.

SIR,—1. I am directed by the President of the Board of Agriculture and Fisheries to inform you that special inquiries have been made by a Commissioner of the Board with the object of ascertaining the character and extent of the probable demand for land settlement among the troops in France. The information obtained indicates that while a considerable number of men with previous agricultural experience desire to obtain small holdings of sufficient size to provide them with a livelihood there are a much larger number of men who would prefer to depend mainly on employment for wages, but who are anxious to obtain an untied cottage together with a small area of land exceeding 1 acre, which could be used partly for cultivation, partly for fruit growing, partly for keeping pigs and poultry, or, if the area permitted, a cow.

2. The Board think, therefore, that Councils should be prepared to establish a considerable number of these cottage holdings, and they are satisfied that their provision will not only meet the needs of the majority

of applicants, but that they will also be of great value to the nation as a whole, and to the agricultural community in particular. They will afford a valuable source of additional labour in agricultural districts; they will help to meet the serious shortage of rural cottages; and they will be the best means of enabling men without much previous experience or capital to begin in a small way with the least possible risk of failure. Such holdings will also be the best means of providing for partially disabled men who require an open-air life and who, with the help of their families, can supplement from the produce of their holdings their pensions and any wages they can earn.

3. The character of these cottage holdings will vary in different districts. In some counties they might be devoted mainly to dairying on a small scale by providing from one to two acres, with the cottage, for growing roots and fodder crops, together with a common cow pasture which might be managed by the Parish Council for a group of holdings. I am to enclose for your information a copy of a Letter and Memorandum* on this type of holding which is being sent by the Essex County Council to the Parish Councils in that county, and I am to suggest that similar action might be taken in your county if the conditions are suitable.

4. In districts where the land is suitable and facilities exist for marketing the produce, cottage holdings might be established mainly for growing fruit or market-garden crops, while the keeping of pigs and poultry should always be associated with such holdings.

5. Under the Small Holdings and Allotments Act, 1908, Councils have power to erect houses on holdings exceeding one acre, and there is no reason therefore why immediate steps should not be taken to acquire small areas of land throughout your county for the provision of cottage holdings, so that the erection of the necessary houses may be put in hand as soon as possible. The Board feel sure that many landowners will be glad to place land at the disposal of Councils for this purpose, and in this connection I am to suggest that special consideration should be given to the acquisition of glebe, which is often good land conveniently situated.

6. The provision of cottage holdings will be the best method of meeting the needs of men who prior to joining the Forces were employed in the large towns, but who desire to settle on the land. A considerable number of such men have acquired a taste for an open-air life, many of them were brought up in the country and some of them have gained experience from the cultivation of allotments in the urban areas. It is obviously desirable from the national point of view that such men should be encouraged to settle on the land, and the Board desire to commend specially to the Councils of County Boroughs the importance of dealing promptly with any demand of the kind from ex-service men belonging to the large boroughs. Under the Small Holdings and Allotments Act, 1908, the Councils of County Boroughs are empowered to provide holdings for their residents, and they have powers of acquiring land for the purpose either within or without the borough. The Board's District Commissioners will be glad to assist Councils of County Boroughs in the selection of suitable land, and in the equipment and adaptation of the holdings. The energies of County Councils will be fully occupied for some time to come in providing for the needs of their own applicants, and it will not be possible for them in most cases to accept applications from residents

* This Letter is not here printed, but the Memorandum is given below.

in County Boroughs, for whom they have no special responsibility. Lord Ernle is of opinion' therefore, that the Councils of the County Boroughs should themselves undertake the responsibility of dealing with applications from their ex-service residents who desire to settle on the land.

7. With regard to the larger holdings of sufficient size to provide a livelihood for the holder and his family, the Board think that as a general rule, in order to secure the advantages of co-operation, they should be established in groups in the most suitable districts. If an applicant desires a self-supporting small holding equipped with house and buildings he should be prepared to move to any part of the county where holdings of the kind can be provided, and the Council should not feel bound to acquire any particular land specified by the applicant.

8. As a large number of applications for land are being received by Councils, I am directed to say that the Board attach great importance to the applicants being interviewed as soon as possible. In the case of men who are in this country the best method is to arrange for small sub-committees to interview tbe men promptly at different centres as near as possible to their homes, so that local information can be obtained as to their capabilities and qualifications. With regard to men who are still serving in the Forces abroad, their applications should be acknowledged and they should be asked to give the Council notice of when they expect to return home either on leave or permanently, so that an interview may be arranged. It will obviate difficulties and disappointment if the men feel that their applications are dealt with promptly and sympathetically, while in the case of men who have not sufficient experience to be accepted as approved applicants for small holdings it is obviously desirable that they should be told so at once, so that they may lose no time in seeking some other occupation.

9. In the selection of approved applicants the Board think that so far as men who ask for self-supporting small holdings are concerned, Councils shonld set a high standard. It would be mistaken kindness to the men themselves as well as detrimental to the interests of food production to accept as tenants any men who have not sufficient practical experience and the necessary personal capacity to become successful small holders. They should also have some capital of their own, but in this connection I am to say that it is proposed in the Land Settlement Bill, which will shortly be introduced, to empower County Councils to advance loans to their ex-service tenants who have not sufficient capital of their own to assist them in the purchase of live stock, implements, seeds and fertilisers.

10. With regard to the training of men who desire to settle on the land, but who have little or no practical experience, I am to say that a further communication will be sent to you shortly explaining the Board's plans, but in the meantime I am to say that any training schemes which are established by the Government will be designed to give to unskilled men such practical experience as will enable them to obtain employment on the land as wage earners. The Board do not think it is practicable to attempt to provide courses of training that would fit an unskilled man to become a small holder on his own account, and they think that such men should, in the first instance, seek employment on the land as wage-earners. In view of the casualties among the agricultural labourers who joined the Forces, and the increased area of land under the plough, there should be many openings for additional

labour on the land, and the rates of wages now current have rendered such employment far more attractive than it was before the War.

11. The Board have been glad to observe that so many Councils are taking active steps to acquire land for settlement, and they have information of a considerable area which has already been acquired, or is the subject of negotiations. In most cases, however, vacant possession will not be obtained in the ordinary course before Michaelmas, 1920, and Lord Ernle desires me, therefore, to urge upon your Council the supreme importance of endeavouring to acquire land which will be available for settlement at an earlier date. In the case of small areas for the establishment of cottage holdings it should be possible in many cases to arrange with the owners and occupiers for early possession so that no time may be lost in erecting the cottages.

12. It has been decided that the loans for the purchase and equipment of land for settlement shall be issued by the Public Works Loan Board under the same procedure as was in force before the War. Councils who have purchased land with the approval of the Board should, therefore, apply to the Local Government Board for sanction to borrow and then to the Public Works Loan Board for the loan, unless they are able to borrow on better terms in the open market.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

ENCLOSURE.

Note on Land Settlement, prepared by the Essex County Council.

THE County Council believe that a number of ex-service men who wish to settle on the land in or near their own villages will be anxious to rent an untied cottage with an acre or two of land attached, but will prefer to work for wages rather than depend entirely on the production of their holdings.

It is suggested that in order to meet this expected demand a sufficient number of cottages should be built in each village and that each should have from 1½ to 2 acres of land attached. A cowshed and pigstye should also be provided.

Each intending small holder should have a certain amount of capital—£25 to £40—and, under a system of credit, it is hoped that a similar amount might be advanced to him to supplement this capital. The money should be spent in the purchase of a cow, a pig, seeds, manure, etc. It is essential that the cow should be insured.

The land should chiefly be devoted to growing winter feed for the cow. A common pasturage should in addition be provided at a fixed rent for grazing the cow during seven or eight months of the year. This pasture would be provided by the County Council and might be managed by the Parish Council or some other local body who would receive the rent and superintend the upkeep of the land—draining, fencing, cutting thistles and, when necessary, manuring.

The occupier of the holding would work for wages and in his spare time cultivate his plot of land. It is important that horse cultivation should also be obtainable at reasonable times, and this could be arranged for by a system of co-operation possibly extending over several parishes.

The care of the cow and pigs would devolve upon the small holder's wife or family, who would in this way become associated with the successful working of the holding.

The County Council believe that the provision of holdings of this size, which will enable the occupier to work at the same time for a wage, will give many ex-service men an opportunity of acquiring a knowledge of farming and a love of country life without the anxiety and strain that would fall upon a possibly inexperienced man who attempted to make a living from a holding alone. If successful on this small holding they will later on be able more confidently to take a larger one.

The keeping of cows will at the same time provide a much needed supply of milk in country districts and will thus benefit the inhabitants as well as provide a source of income to the small holder.

War Allotments.

THE following Circular Letter was addressed to the London County Council and to the Councils of Boroughs and Urban Districts in England and Wales by the Food Production Department of the Board on 21st February :—

SIR,—1. The Board of Agriculture and Fisheries desire to call attention to the position which will arise at the termination of the War when D.O.R. Regulation 2L ceases to operate.

2. The Board's right of occupation under that Regulation will then cease, and their continuance in occupation will be under the Defence of the Realm (Acquisition of Land) Act, 1916. The Board will be able under that Act "for the purposes of the public service" to exercise in relation to land entered on under Regulation 2L all the powers conferred by that Regulation, but the terms and conditions of their occupation, including rent, will, failing agreement, be in practice determined by a single arbitrator agreed by the parties.

3. In determination of the rent the considerations of Paragraph 6 of the Schedule to the above-mentioned Act are to apply. That paragraph is as follows :—

> "6. In determining the amount of compensation, the value of the land acquired shall be taken to be the value which the land would have had at the date of the notice to treat if it had remained in the condition in which it was at the commencement of the present War, without regard to any enhancement or depreciation in the value which may be attributable directly or indirectly to any buildings, works, or improvements, erected, constructed, or made on, over or under the land, or any adjoining or neighbouring land for purposes connected with the present War wholly or partly at the expense of the State, or, with the consent of the occupying Department, at the expense of any person not being a person interested in the land :
>
> Provided that :—
>
> (a) where any such building, work or improvement was erected, constructed, or made in pursuance of an agreement with any person interested in the land, the consideration given by such person shall be taken into account in assessing the compensation payable in respect of such interest :
>
> (b) where by virtue of an agreement with any Government Department any person interested in the land is entitled as between himself and that Department to the benefit of any such building,

work, or improvement, the value attributable to such building, work, or improvement shall be taken into account in assessing the compensation payable in respect of such interest;

(c) where, since the commencement of the present war, any person interested in the land has himself erected, constructed, or made any building, work, or improvement, or has contributed to the expense thereof, or has committed any act depreciating the value of the land, the value attributable to his expenditure or the depreciation in v lue attributable to such act shall be taken into account in assessing the compensation payable in respect of such interest."

4. There will not in these cases be any "notice to treat," but it will be desirable, if not essential, that the owner and tenant (if any) of the land should receive notice of the intention of the Board to continue in occupation of the land until further notice. The Board cannot well indicate more fully the period of their occupation until they know the rent and other conditions that will attach to the occupation, as these, and in particular the rent, may in some cases make continued possession so expensive that it would be undesirable.

5. This notice should be given soon, and be accompanied by an offer to negotiate the rent and conditions of occupation, and a form of notice is attached.*

6 The negotiation as to the rent and conditions must naturally aim at arriving at the probable rent and conditions that an arbitrator would award.

7. The rent offered should, as a general rule, be the post-war annual value of the land in the condition in which it was at the time of entry by the Board. As regards tenure, it would be well to provide for a continuance of possession until the expiration of two years from the termination of the War, and if the Board obtain the Railway and Canal Commissioners' consent to their further continuance of possession, then until the expiration of the period allowed by the Commissioners; but possession should be determinable—

(a) by the Board at Lady Day or Michaelmas by three months' notice; and

(b) by the landlord at any time if the land is reasonably required for building or industrial purposes.

8. The Board will, in proper cases, have to agree to restore the land, if so required by the landlord, to the condition in which it was at the time of entry by the Board or at their option to pay compensation for its not being so restored. This will be subject to any arrangements already made for payment of compensation.

9. The Board would reserve the right to remove all fences and erections on the land.

10. Where possible the Council should at the same time arrive at a provisional settlement of the claim for compensation under Regulation 2L, for the occupation by the Board up to the termination of the War.

11. The powers of the Act of 1916 are conferred on the Board as the "occupying department," but while the Board remain in occupation under the Act, they will be able to exercise the power now conferred on them by Paragraph (5) of Regulation 2L, and to authorise your Council to act on their behalf in arranging for the cultivation of the land. This

* Not here printed.

power the Board will exercise when the time arrives, and in the meantime your Council is requested to negotiate the terms and conditions of the Board's continuance of possession *subject in every case to the approval of the Board.*

12. In many cases the Council will find it possible to arrange for acquiring the land on lease for allotments under the Small Holdings and Allotments Act, 1908, and for putting an end to the temporary occupation under Regulation 2L, and wherever this course is possible, it should be adopted.

I am, etc.,
(Signed) F. L. C. FLOUD,
Assistant Secretary.

THE following Circular Letter was addressed to Clerks of County Councils and County Borough Councils in England and Wales by the Board on 25th February :—

Destruction of Rats. *SIR,—I am directed by the President of the Board of Agriculture and Fisheries to say that many Local Authorities still fail fully to realise the responsibility vested in them under the Rats Order, 1918,*and the importance of their initiating measures to reduce the damage to property and foodstuffs which is being caused by rats. As the period between now and the end of March is the most favourable in which to wage war against this national enemy, it is most important that effort should be made in every locality, by all concerned, to reduce the number of rats as much as possible within the next month. As has already been pointed out in the Board's Circular Letter of 20th January,† co-operation and co-ordination by all concerned are essential if any measure of success is to be attained ; and laxity, even in districts where rats are believed to be few, is bound to counteract energetic action on the part of those who fulfil their duties under the Order. Rats are migratory animals and will naturally seek quarters, and increase, where they are allowed to remain undisturbed. On these grounds alone lack of systematic measures and persistent efforts in any district will obviously prove an expensive policy in the long run.*

For the guidance of those Local Authorities who have not yet formulated any definite scheme under the Order, I am directed by Lord Ernle to forward the enclosed notes,‡ and to express the hope that they may be considered at the earliest possible date. Whilst any and every proved and suitable means for compassing the destruction of the rat is to be encouraged, it is necessary, in order to secure the best results, that the measures taken should be controlled and co-ordinated by persons with a knowledge of the subject and capable of organising a campaign on broad and sound lines. It should be borne in mind that in addition to the vast amount of damage to food and property caused by rats, very considerable sums of money are expended by owners in every district in spasmodic and frequently fruitless efforts to clear their premises. Such persons would willingly pay for the services of trained men to clear their premises, and any owner of infested premises who demurs or refuses to take the steps considered necessary by the officer of the Local Authority should have notice served upon him, and

* Printed in this *Journal*, September, 1918, p. 761.
† ,, ,, February, 1919, p. 1380.
‡ See below.

action should be taken under Article 2 of the Order. There should be no difficulty therefore in the expenses incurred by the Local Authority being recovered from the individuals who would directly benefit.

The Board understand that in many districts the efforts of Local Authorities and others in connection with the Rats Order, 1918, have been hampered by reason of inability on the part of those concerned to procure the necessary poison. In the event of your Local Authority experiencing difficulty in obtaining a suitable rat destructive preparation where it is required in large quantities, Messrs. Haller & Co., of 52, Leadenhall Street, London, E.C. 3, who supply an inexpensive preparation for the purpose, might be referred to. This preparation, if carefully used, is said to be non-injurious to human beings and domestic animals, including poultry.

In this connection the enclosed copy* of an extract from a letter received by the Board from Messrs. Haller & Co., is sent for your information.

Where a preparation with the above properties is required in small quantity, a *Scilla maritima* (known as Squills) recipe, which is embodied in the enclosed notes, might be recommended. Care, however, should be used during preparation as the *Scilla maritima* acts as an irritant on the skin.

In cases where poison can be safely used such firms as

Mr. G. W. Harrison, Chemist, Reading;
Messrs. Sandford & Sons, Sandy, Bedfordshire;
Extirmo, Ltd., School Street Works, Hull;
The Zeba Co., 66, Seel Street, Liverpool; or
Mr. Harley, Chemist, Perth ("Rodine");

might be referred to. It must be understood, however, that the Board do not guarantee or recommend any particular proprietary poison.

I am, etc.,
(Signed) A. D. HALL,
Secretary.

ENCLOSURES.

NOTES ON THE DESTRUCTION OF RATS.

1. **Suggestions for the Assistance of Local Authorities.**—Appoint an official as Executive Officer to the Local Authority. An ex-naval or military officer with a knowledge of the subject, and accustomed to routine work and a good organiser would be a suitable person. If advertisement for such an officer is unsuccessful application should be made to the Ministry of Labour, Queen Anne's Chambers, Westminster, S.W. 1. On such an appointment being made the name and address of the officer should be forwarded to the Secretary, Board of Agriculture and Fisheries, 4, Whitehall Place, London, S.W. 1.

Duties of Rat Officer.—(1) To inspect the area entrusted to his charge and collect and tabulate all information concerning rats therein (Card Index).

(2) To get into touch with all farmers' associations, clubs and other bodies of a similar character who would be likely to assist him in carrying out his work, and to organise such associations, clubs, etc., if thought

* See below.

advisable, into parish, district and county associations which would be of a voluntary character.

(3) To engage assistants to lay baits and to do all work necessary to destroy rats and to supervise these assistants. As such men would be entrusted with "poison" they must be sober and trustworthy. Ex-service men of good character who have had previous experience in rat destruction as under-gamekeepers or otherwise should prove especially suitable.

The Board will at any time be glad for Mr. E. C. Read, who has had 25 years' experience on the Continent in dealing with the rat menace, and has recently been appointed Technical Adviser to the Department in connection with rat destruction, to give Local Authorities or their officers any advice they may require.

It must be understood that any measures to be effective should be of a permanent nature, and the assistants should visit all infested areas at regular intervals of, say, 8 to 12 weeks.

2. **Measures Recommended for Prevention of Invasion and Destruction of Rats.**—(1) *Ports.*—To prevent entry of foreign rats into the country, all incoming vessels should be fumigated or otherwise dealt with by competent persons. Sulphur dioxide (SO_2) applied through a suitable appliance (*e.g.*, Clayton gas apparatus) is recommended for this purpose. Care should be taken to prevent vessels from again becoming infested before clearance.

(2) *Urban Districts.*—All premises on which presence of rats is suspected should be inspected. Drains to receive special attention. Infested premises to be made as rat-proof as possible; drains and connections between premises and sewers to be properly trapped and in good repair. It is estimated that in 75 per cent. of the cases of rat invasion of shops and dwelling houses in urban districts the invasion is due to defective drains. Refuse and garbage should be removed or placed in rat-proof receptacles and attention paid to proper storage of comestibles, etc.

Rat poisons non-injurious to human beings and domestic animals, such as *Scilla maritima* (Squills) and bismuth, or the lesser poisons, as $BaCO_3$ (barium carbonate), and traps can then be used to great advantage. Barium carbonate is a very good and probably one of the safest poisons. It has the merit of being tasteless and odourless when conveyed in a proper medium. This poison has been largely used by the authorities for the destruction of rats in the plague areas of India.

A well-known continental way of destroying rodents is to bake a pancake—egg pancake not essential, but beef dripping advisable—to which 20 per cent. of finely-chopped *Scilla maritima* (Squills) red variety is added, either to the batter before frying, which is simpler, or placed between two layers of pancake after frying. When cold the pancake should be cut in pieces of about ½ in. square and laid in the rat runs or holes.

Rats are particularly susceptible to the effects of *Scilla* (Squills).

If *Scilla* in a bulbous form is not obtainable a solution of squills is manufactured by, amongst others, Haller & Co., 52, Leadenhall Street, E.C. 3, who can give information as to its application in the liquid state.

(3) *Rural Districts.*—In places where there is no danger to human beings, domestic animals, poultry, or foodstuffs, other poisons may be usefully employed; these should be judiciously laid by trained men.

Trapping, ferrets, and, under favourable conditions, viruses can all be made use of according to the conditions of the area involved.

Carbon-bisulphide (CS_2) is often applicable on allotments and small holdings. Pieces of wadding or cotton waste are soaked in the liquid to saturation point, placed well in the rat holes and the hole immediately covered in. *On account of the highly volatile nature of* CS_2 *no light or smoking should be allowed during its application.* It is of paramount importance to see that rural buildings, farmyards, granaries, etc., etc., do not harbour garbage, and that all foodstuffs are properly protected from rats.

The building of stacks on staddles should be encouraged. Before threshing commences the stacks should be surrounded with fine-meshed wire, not less than 4 ft. in height and at sufficient distance from the stack to prevent rats clearing it from the stack.

The cost of the destruction of rats should be borne by the owner or occupier of the premises on which the operations are carried out. In dealing with an infested area the attack should be commenced on the boundaries of the area and gradually close in towards the centre.

EXTRACT FROM A LETTER RECEIVED BY THE BOARD FROM MESSRS. HALLER & CO., DATED 11TH FEBRUARY.

SIR,—Agreeably with the invitation of the Board conveyed by a visit of Mr. Ernest C. Read on the 23rd ult., we beg to state that we can supply liquid Extract of Squills, the same as manufactured at the Pasteur Institute, Paris, under the direction of Dr. Danysz, and as used during the War in the trenches and on formations in France, in the case of large quantities being required, say not less than 500 to 1,000 gal. at a time, at 3*s.* per gal., *ex* our laboratory in London, packages to be charged extra, which, however, may be returnable.

This Extract would be of such a standard, that on an average one cubic centimetre, made into bait with from 5 to 7 gram. of suitable matter (milk or broth, stale bread, rolled oats, dry brewers' grain, etc.) would constitute a mortal dose to the average rat of a given locality. We have established this standard to our own satisfaction by a series of tests and experiments carried out at the laboratory and under the supervision of Professor Hewlett of London University, and his reports are at the service of the Board. But probably it would be advisable that a common standard as between the local authorities disposed to give us an order and ourselves as sellers should be established.

The Extract could be sent out in wooden barrels or in iron drums, and in these closed packages would remain in perfect condition for a week or more. Details of making the bait need not here be described, but the most suitable materials and their respective quantities would be as follows :—

To 1 gal. of extract,
2 gal. of fresh milk or broth,
1 lb. sugar,
30 lb. of bread or rolled oats (without husks) dry brewers' grain, etc., making together say 60 lb. of bait.

One gal. of Extract containing, say, 4,500 mortal doses (1 gal. = 4,540 cc.) and consequently, 60 lb. of bait made therewith, 1 lb. of this bait would contain 75 doses, equal to 4½ doses per oz., thus making say, ¼ oz. of bait a mortal dose.

We should like to submit, if only *pro forma*, a calculation as to the probable cost of the bait :—

	s.	d.
1 gal. of extract	3	0
2 gal. of milk	3	9
1 lb. sugar	0	6
30 lb. bread or oats at 2½*d*.	6	3
Incidentals	1	6

Say 15*s*. for 60 lb. of bait,

equal to 3*d*. per lb. Possibly under present conditions the cost may be slightly higher, but even then, it should not exceed 4*d*. per lb.

Assuming the latter figure as being correct, it would even then represent a potential capacity of killing 75 rats at that expenditure.

As in connection with very large applications of Squills bait, the use of milk would, under present conditions, form a serious obstacle, we could supply a suitable broth, which is readily eaten by rats, to be used instead of milk at a cost of 1*s*. 9*d*. per gal., *ex* laboratory, packages extra.

Foot-and-Mouth Disease.

IN the district scheduled in connection with the outbreak of Foot-and-Mouth Disease, confirmed on 9th January at Littlethorpe, near Ripon, 16 outbreaks in all have been confirmed. On 24th February an outbreak was confirmed at Stanningley (Leeds), the usual restrictions on the movement of animals being imposed. There is evidence suggestive of this outbreak being attributable to those in the Ripon area. Owing to the district being so thickly populated special provision was made for the movement into the area of fat stock for immediate slaughter so as to ensure the meat supply. Two outbreaks have been confirmed in Huddersfield.

Rabies.

OUTBREAKS of Rabies were confirmed near Newport (Mon.) and at Cardiff on 13th and 14th March respectively. Orders have been issued controlling movement of dogs out of an area comprising Monmouth, part of Glamorgan, and a small part of Brecon, and requiring the muzzling of dogs in the areas.

The total number of cases of Rabies which have been confirmed to date since the present series of cases commenced in September last now stands at 127. Of these 97 were in Devonshire and 25 in Cornwall. There are also 16 cases still under investigation, one in Monmouth and one in Glamorgan. The period of quarantine on approved veterinary premises, required for all dogs moved out of those counties to other parts of Great Britain, is six calendar months.

Parasitic Mange in Horses.

IN a letter addressed to the Press, on 8th February, the Joint Committee of the Board and the Ministry of Food state that in July last the Committee directed attention to the prevalence of Parasitic Mange in Horses, and the likelihood of its spreading in the coming months, and also to the issue by the Joint Committee of a Special Leaflet (No. 8)* in which particulars were given :—

* See this *Journal*, August, 1918, p. 581.

(*a*) As to the Orders in existence in regard to the disease.
(*b*) The penalties attached to breaches of the Orders.
(*c*) Means whereby the disease can be prevented, discovered and treated.

Since the issue of this Leaflet (No. 8) two additional Leaflets on the same subject have been published* by the Committee, and have had a very wide circulation.

The letter adds that the Committee are informed that the Local Authorities view with growing anxiety the increasing prevalence of mange in horses reported in the returns furnished by them. Further, there are grounds for believing that the disease exists in many districts to a much greater extent than is revealed in the returns furnished. The Committee point out the serious effect the disease has in decreasing the usefulness of the horse.

Importation of Dogs (Amendment) Order, 1918 (No. 2).

THE Board of Agriculture and Fisheries, by virtue and in exercise of the powers vested in them under the Diseases of Animals Acts, 1894 to 1914, and of every other power enabling them in this behalf, have made an Order to the effect that :—

1. The period of detention and isolation prescribed by the Importation of Dogs Order of 1914 (hereinafter referred to as "the principal Order") is hereby increased to six calendar months, and the principal Order shall be read and have effect as if "six calendar months" were substituted for "four calendar months."

2. In the case of a dog landed after 30th November, 1918, under the authority of a licence granted under the principal Order, the licence shall have effect as if "six calendar months" were therein inserted instead of "four calendar months."

3. The Importation of Dogs (Amendment) Order of 1918 is hereby revoked.

4. This Order may be cited as the Importation of Dogs (Amendment) Order of 1918 (No. 2), and shall be read with the principal Order.

Agricultural Organisation: Propaganda Campaign by the Agricultural Organisation Society.

THE Governors of the Agricultural Organisation Society have decided to undertake forthwith an active and systematic campaign throughout the country for the following purposes :—

(*a*) *To explain to the agricultural community the advantages of combination and co-operation on the part of the farmer.*

(*b*) *To strengthen existing Farmers' Co-operative Societies and to aid the establishment of new societies.*

(*c*) *To secure the adhesion of* 150,000 *additional farmers to the movement.*

The Agricultural Organisation Society consider that the transition from war to peace conditions, with all the difficulties that agriculture

* See this *Journal*, November, 1918, pp. 971 and 976.

will have to face in the future, offer a splendid opportunity to impress upon farmers the great lessons of co-operation in agriculture for business purposes on business lines.

At the present time over 50,000 English and Welsh farmers are members of co-operative farmers' societies, and hundreds are joining every day. *To those farmers who are not members of a co-operative* society it becomes a serious problem how they are to face the future under a system which often compels them to buy their requirements—the raw materials of their industry—at retail prices and sell their produce at wholesale prices in markets over which, without organisation on co-operative lines, they can exercise no control.

Co-operation will go a long way to solve these difficulties, and the best agricultural opinion is that the farming industry—the greatest industry in the land—must be reorganised and put on a better business footing in the same way as the manufacturing industries of the country.

The leaders of the campaign, the Earl of Selborne, K.G., Mr. Leslie Scott, K.C., M.P., and Major E. A. Belcher, C.B.E., the Society's new Director of Propaganda, with their supporters, will tell the farmers at meetings, which are being arranged in succession for every market town in the country, how the objects of the Society can be achieved and what results have already been obtained by the numerous successful societies that have been promoted and fostered by the Agricultural Organisation Society.

Fruit for Jam Making.

THE Food Controller announced on 3rd March that his attention has been drawn to contracts which have been and are being made between jam manufacturers, fruit dealers, and fruit growers for various kinds of fruit to be delivered during the coming season at prices greatly in excess of those obtaining last season. The Food Controller wishes it to be clearly understood that, should evidence continue to accumulate that fruit prices are likely to reach unreasonable limits during the approaching season through speculation at this juncture, he will consider it his duty to re-impose the control exercised during the past two seasons.

Payment of Prisoners of War Employed on Agriculture.

THE following further Instruction (Army Council Instruction No. 139 of 1919, dated 25th February, 1919), has been issued by the War Office regarding the rates of pay due from employers of prisoners of war engaged on agriculture.

Farmers and other employers of prisoners of war must pay the full local rates in all cases for prisoner of war labour. No exceptions can be made to this rule.

Where the farmer is responsible for the guarding of prisoners of war during the hours of work, an abatement of 4*d*. per day per prisoner of war may be allowed.

Where prisoners of war are fetched over one mile by the farmer, or by soldiers of agricultural companies in the employ of the farmer, an additional abatement of 4*d*. a day may be allowed.

Attention is called to para. 39 of A.C.I. 1324 of 1918* providing that prisoners of war shall put in the full number of working hours on the farms. In cases where the prisoners of war do not put in the full number of working hours customary in the locality (allowing for meal-times) a proportionate amount for the number of hours actually put in will be charged. When, however, the failure to put in full time is due to the failure of the farmer to fetch the men in time, a full charge will be made. The rate for overtime is to be full local rate for overtime work.

Revocation of Statutory Rules and Orders affecting Farmers. THE following Orders have recently been revoked by the Food Controller :—

No. of Order.	Title of Order.	Page of *Journal* in which Order was Published.
No. 821 of 1917	Barley (Restriction) Order, 1917	September, 1917, p. 683.
No. 1029 of 1918	Cereals (Restriction) Order, 1917.	September, 1918,† p. 745.†
No. 1082 of 1918	Vegetable Marrow Order, 1918.	October, 1918, p. 882.
No. 1331 of 1918	Horses (Rationing) Order, No. 2, 1918.	November, 1918, p. 1015.
No. 444 of 1917	Dealings in Oats (Restriction Order, 1917.	June, 1917, p. 364.

Overtime and "Walking Time" in the Payment of Agricultural Wages.

IN the issue of the *Wages Board Gazette* for 18th February, 1919, it is stated that the Wages Board have made an Order further defining as overtime employment all employment in excess of 6½ hours on a Saturday or on such other day (not being Sunday) as may be agreed between the employer and the worker. The Order, which came into operation on the 3rd March, is based substantially on the Board's proposal of 10th January, but a modification has been introduced which affects the position of special classes of workers whose weekly wages are based on "customary" hours. In the case of these workers, the time spent by them in connection with the feeding and cleaning of stock will not rank as overtime employment, notwithstanding that the performance of these duties has the effect of bringing the time worked by them on the short day to more than 6½ hours.

The effect of the new Order and of the Orders fixing minimum rates of wages already in force may be illustrated by reference to the cases of (1) an ordinary labourer to whom the minimum rate applicable is 30*s*. for 54 hours, with overtime rates for all hours in excess of 54 in any week; and (2) a horseman to whom the minimum rate applicable is 36*s*. for a week of "customary" hours, with overtime rates to apply only after "customary" hours are exceeded.

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* Not printed in this *Journal*.

† See also this *Journal*, January, 1919, p. 1237.

In the first case it will be possible, when a half-holiday is not at present given, to provide for the granting of a half-holiday and yet for the 54 hours to be worked for the 30*s.* By increasing the daily hours on each of the five days from 9 to 9½, so that only 6½ are worked on the sixth day, the total number of hours worked will be 54, but none of the time will rank as overtime, and the weekly wage payable will be 30*s.*

In the second case, the horseman will only be required, in order to be entitled to the full 36*s.*, to work, in addition to the customary hours on five days, 6½ hours on the sixth day, *plus the time necessary on that day to feed and clean his horses.* If the worker is required to put in a full day on the sixth day, he will be entitled to be paid at the overtime rates for all hours in excess of 6½ on that day, except such as are spent in connection with feeding and cleaning his horses. On the other hand, if the worker does not put in 6½ hours on the sixth day over and above the time necessary to feed and clean his horses on that day, he will not be able to claim the full 36*s.* for his week's work, but only a proportionate part of it.

In the case of counties where there are no special rates for stockmen, but these workers are paid on the basis of the minimum and overtime rates for ordinary labourers, *e.g.*, 30*s.* for 54 hours, with overtime for all time worked in excess of 54 hours in any week, overtime would still be payable for all time worked in excess of 54 hours in any week, notwithstanding that the excess over the 54 hours was spent exclusively in connection with the feeding and cleaning of the stock. The provision in the existing Orders requiring overtime to be paid for all time worked in excess of 54 hours is not affected by the new Order.

Another point which is the subject of inquiries is the payment of "walking time" which is dealt with in the issue of the *Gazette* for 1st February.

The position with regard to this matter appears to be as follows: In the absence of any special provision in the contract of service or of any well established custom of the farm, the time spent by the worker in proceeding from his cottage to his place of work would not be reckoned as employment for the purpose of calculating the wages payable to the worker at not less than the minimum rates. By "place of work" is here meant the actual place where the work is carried on, but if a man's duties require him to go and return to the farm-house before or after his work in the fields (*e.g.*, for the fetching or taking back horses or tools) the time occupied in walking between the two places would rank in his working hours. But if his duties are such that he can go straight from his home to the place of work in the fields and back in the same way, the walking time would not be so reckoned, unless his contract or the custom of the farm provide that he should be paid for that time.

The custom of the locality or of the particular farm is of importance in this connection. If it can be proved that it is the custom that the walking time should be paid for as work time, and if the worker has not agreed with his employer that such custom shall be excluded in his case, the worker would be entitled to be paid for the walking time. The burden of proving the custom would lie on the worker: if it were proved, the custom must be read into the contract of service unless it is expressly excluded. The matter is, however, one which is governed by the custom as incorporated in the contract of service, and not by the Corn Production Act or the Orders of the Wages Board.

Report of the Work of the Government Laboratory, 1917-18.

IN the Report of the Government Chemist upon the work of the Government Laboratory for the year ended 31st March, 1918, it is stated that the number of samples examined for the Board of Agriculture and Fisheries, the Board of Agriculture for Scotland, and the Department of Agriculture and Technical Instruction for Ireland, was 1,568 (exclusive of salinities) as compared with 2,075 in the previous year.

Sheep Dips.—Fourteen samples of sheep dips were received for examination in connection with applications by manufacturers for inclusion of their preparations in the official "Schedule of efficient dips." Before the Board of Agriculture give their approval to any dip they must be satisfied that the formula provides for a sufficient quantity of a recognised active ingredient, and that the dip has been made in accordance with the formula. In ten cases the samples were found to agree with the formulæ, and were of effective strength at the proposed dilution; one was deficient in active ingredients at the dilution submitted by the makers; in the remaining three cases the formulæ required modification to ensure an efficient dip. Thirteen samples of approved dips, purchased in different parts of the country, were also examined with the object of ascertaining whether the dips as sold corresponded in composition with the samples which had received the Board's approval. The analyses showed that four of these had not been prepared according to the formulæ previously submitted and approved.

The miscellaneous samples examined for the Board of Agriculture and Fisheries included samples for the Food Production Department; waste materials as to their value as fertilisers, milling by-products; basic slag and slags from waste tip-heaps as to their value.

Questions submitted by the Board for Report.—It is stated in the Report that in the course of the year numerous matters were submitted by the Board for report. Many of these related to the value of materials supplied as feeding stuffs, and to the supply of potash and phosphatic manures.

Sale of Food and Drugs Acts.—The following are the particulars of two important cases as to butter and milk examined under the Sale of Food and Drugs Acts:—

Butter.—One sample contained excess water; but the evidence as to the presence of foreign fat in the other case was not conclusive.

Milk.—In the 75 cases in which certificates were issued the charges were as follows:—In 42 cases, added water; 25, abstraction of fat; 6, added water and abstraction of fat; and 2, presence of dirt. Boric acid and artificial colouring matter were also alleged to be present in two of the samples.

Fertilisers and Feeding Stuffs Act.—The samples under this Act were submitted by the Board of Agriculture and Fisheries in connection with applications by local authorities for the consent f the Board to proceedings against the sellers.

The number of samples received was 20, consisting of 8 fertilisers and 12 feeding stuffs, against 26 in the previous year.

The fertilisers consisted of phosphate, guano, shoddy and special manures.

The feeding stuffs examined consisted of feeding meals and cakes, milling by-products and poultry foods. Several of the meals contained a considerable proportion of substances unsuitable for feeding purposes.

Agricultural Legislation in the United States.

THE provisions of the House Resolution of 7th September, 1918,* sanctioning expenditure for certain agricultural purposes, were embodied in an Act approved by Congress on 21st November, 1918, with the following amendments in the sums voted :—

The grant for purposes connected with live stock and animal products was inc eased to $1,058,975 (£218,500).

The sum allocated for gathering information regarding articles of food, improving the market news service, etc., was increased to $1,955,608 (£407,400).

A grant of $811,300 (£169,000), not included in the House Resolution, was made "for the prevention, control and erad cation ot insects and plant diseases injurious to agriculture, and the conservation and utilisation of plant products."

Removal of certain Restrictions in regard to Eggs.

THE Food Controller has issued a General Licence, dated 11th March, 1919, authorising any person until further notice to deal in eggs notwithstanding that such person is not the holder of a licence as a wholesale dealer in eggs under the Eggs (Licensing of Wholesale Dealers and Distribution) Order, 1918,† and also providing that on and after the 17th March, 1919, until further notice, any eggs may be sold or bought free from the restrictions imposed by the Eggs (Prices) Order, 1918.‡

Journal Supplement on Potatoes.

WITH this issue of the *Journal* is published a Supplement dealing with the cultivation, composition and diseases of the potato, including a full Report on the experiments in connection with Wart Disease, and the results of the spraying campaign conducted during the summer of 1918. The Supplement is excellently illustrated. Copies of the Supplement are obtainable at the price of 6*d*. per copy, post free, and in view of the difficulties relative to printing and paper it is desirable that orders should be sent at the earliest possible date.

Prosecutions of Farmers, etc., under Statutory Rules and Orders.

Bridge of Allan.—A fine of £25 was imposed upon James Hay, farmer, for failing to harvest five acres of oats before it was too late to save the crop. The loss was estimated at from £65 to £100.

Long Crendon.—John Hawes, Addingrove Farm, Oakley, charged with using wheaten flour for other purposes than for human food, was fined £40.

Oxford.—H. D. B. Vanderstegen, Cane House Farm, Kidmure, was fined £30 for unlawfully permitting barley to be damaged.

Roxburgh.—Alex. Waddell, Palace, Jedbrough, for allowing fields of crops to waste, was fined £50. (*National Food Journal*, 26th February, 1919.)

* Summarised in this *Journal* for November, 1918, p. 982.

NOTICES OF BOOKS.

National Year-book of Agricultural Legislation, 1917.—The International Agricultural Institute has just issued its seventh International Year-book of Agricultural Legislation. The volume contains some 1,500 pages written in French with a 74-page introduction in English, in which the general course of the legislation of the World in 1917 in connection with agriculture is outlined, principally as affected by the conditions created by the War.

The body of this volume is divided into 11 sections giving account of the legislation in all the principal agricultural countries in the world affecting (1) agricultural and commercial statistics, (2) trade in agricultural products, machinery, manures and live stock, (3) finance and customs in relation to agriculture, (4) crops and vegetable products industries, (5) live stock breeding and animal products industry, (6) agricultural organisation and education, (7) plant diseases, weeds and plant pests, (8) agricultural co-operation, insurance and credit, (9) rural property and closer settlement, (10) relation between capital and labour in agriculture, and (11) rural hygiene and rural police.

There are two good indexes (in French), to the volume, arranged according to (1) country, (2) subject.

The price of the volume is 8*s*., or 2 dollars. Remittances should be forwarded to the Secretary, Board of Agriculture and Fisheries, 3, St. James's Square, London, S.W. 1.

MISCELLANEOUS NOTES.

Notes on Crop Prospects and Live Stock Abroad.

THE *International Crop Report and Agricultural Statistics* for February, 1919, published by the International Institute of Agriculture, gives particulars concerning the production of the cereal crops of 1918 in certain countries in the Northern Hemisphere. *Wheat*.—The production in Denmark, Spain, United Kingdom, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland, Canada, United States, British India, Japan, Egypt, and Tunis is estimated at 251,647,000 qr. in 1918, against 210,798,000 qr. in 1917, or an increase of 19·4 per cent. *Rye*.—The estimated production in Denmark, Spain, Ireland, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland, Canada, and United States is placed at 21,102,000 qr. in 1918, or an increase of 34·6 per cent. compared with 1917, when it amounted to 15,680,000 qr. *Barley*.—The production in Denmark, Spain, United Kingdom, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland, Canada, United States, Japan, Egypt, and Tunis is estimated to amount to 76,919,000 qr. in 1918, against 67,952,000 qr. in 1917, or an increase of 13·2 per cent. *Oats*.—It is estimated that the total yield in Denmark, Spain, United Kingdom, Italy, Luxemburg, Norway, Netherlands, Sweden, Switzerland, Canada, United States, Japan, and Tunis amounts to 262,581,000 qr. in 1918, against 256,265,000 qr. in 1917, or an increase of 2·5 per cent. *Maize*.—The production in Spain, Italy, Switzerland, Canada,

United States, and Japan is estimated at 313,153,000 qr. in 1918 against 371,100,000 qr. in 1917, or a decrease of 15·6 per cent.

In the Southern Hemisphere the production of wheat in Argentina in 1918-19 is estimated to amount to 23,027,000 qr against 27,320,000 qr. in 1917-18, or a decrease of 15·7 per cent and of oats to 4,524,000 qr., against 7,771,000 qr., or a decrease of 41·8 per cent.

Sowing of Winter Cereals in the Northern Hemisphere.—The area estimated to have been sown with winter *wheat* in 1918-19, compare with the areas sown during the corresponding period of 1917-18 expressed as percentages, are as follows :—Denmark 89, England and Wales 96, Norway 100, Canada 95, United States 116, British India 69 with *rye* : Denmark 103, England and Wales 95, Norway 100, United States 102 ; with *barley* : England and Wales 97 ; with *oats* : England and Wales 98.

Spain and the Canary Islands.—According to a report issued in the "Boletin de Agricoltura Tecnica y Economica" (Madrid) the production of the principal grain crops in 1918 is given as follows, figures for 191 being given in brackets :—Wheat, Spain, 3,589,800 (3,784,400) tons and Canary Islands, 33,400 (26,400) tons ; barley, Spain, 1,889,70 (1,632,300) tons, and Canary Islands, 29,000 (24,000) tons ; oats Spain, 433,600 (470,800) tons ; rye, Spain, 757,600 (602,500) tons, and Canary Islands, 1,875 (1,330) tons ; maize, Spain, 586,600 (716,900) tons and Canary Islands, 15,400 (15,500) tons. The total acreage in 191 in Spain and the Canary Islands were—Wheat, 10,206,700 acres barley, 4,133,200 acres ; oats, 1,503,500 acres ; rye, 1,817,700 acres maize, 1,167,900 acres. (*The London Grain, Seed and Oil Reporter* 15th March, 1919

Canada.—The Dominion Bureau of Statistics gives the acreage and production of the principal crops in 1918 as follows (figures for 191 being given in brackets) :—Wheat, 189,301,000 (233,742,800) bush from 19,373,000 (14,755,850) acres, an average yield of 11 (15⅘) bush per acre ; oats, 380,273,000 (403,000,000) bush. from 14,790,00 (13,313,000) acres, an average yield of 25¾ (30¼) bush. per acre ; linseed 5,972,000 (5,934,000) bush. (*The London Grain, Seed, and Oil Reporter* 20th February, 1919.)

Australia.—The revised official estimate gives the yield of wheat for the whole of the Commonwealth as 9,381,000 qr., against an earlier estimate of 9,500,000 qr. In 1917 the yield was 14,431,000 qr., and in 1916 18,900,000 qr. (*The London Grain, Seed, and Oil Reporter* 21st February, 1919.)

South Africa.—According to the December official bulletin for the Union of South Africa there is a decrease of 11 per cent. in the area under maize, following an increase of 5 per cent. last year. A normal yield from the acreage planted would give 5,000,000 qr., which would be considered a full crop. (*Broomhall's Corn Trade News*, 5th March 1919.)

Live Stock in Denmark.—The number of pigs according to the census of the 10th December, 1918, is 726,844, against 752,711 on the 10th September, 1918, 513,012 on the 5th February, 1918, and 2,496,70 on the 15th July, 1914. (*International Crop Report and Agricultura*

Live Stock in the United States.—The numbers of live stock on gricultural and breeding farms, according to statistics of the 1st anuary, 1919, are as follows (the corresponding figures on the st January, 1918, being shown in brackets):—horses, 21,534,000 21,555,000); mules, 4,925,000 (4,873,000); milch cows, 23,467,000 23,310,000); other cattle, 44,399,000 (44,112,000); sheep, 49,863,000 48,603,000); pigs 75,587,000 (70,978,000). (*International Crop Report nd Agricultural Statistics*, February, 1919.)

Agricultural Conditions in England and Wales on 1st March.

THE Crop Reporters of the Board, in reporting on the agricultural osition on 1st March, state that the wet weather, with occasional severe frost and snow, has greatly delayed cultivation and very little spring sowing has been done. Only during the last days of the month has general progress been possible. Autumn-sown crops have not suffered to any serious extent, and wheat is generally described s healthy and promising, though there has been some deterioration nd loss of plant on low-lying, wet land. Probably from one-third o one-half of the crop may need a spring top-dressing. Oats and beans eem to be generally vigorous and promising.

Ewes are healthy, and their condition, though somewhat lowered by he inclement weather, is on the whole fair. Lambing is still in its rlier stages, but so far the fall seems fairly satisfactory. In some few stances the trying conditions have resulted in losses both of ewes and mbs.

Other live stock are healthy, but the shortage of foodstuffs and the evere weather have combined to keep them in moderate, or at best, nly fair, condition. The supply of winter keep is getting low in many laces, but on the whole seems likely to prove sufficient.

The labour shortage is gradually becoming less acute as demobilisaion proceeds, but conditions vary greatly in different districts, some armers having all the men they need for present requirements, and others eing still short-handed. Skilled labour is greatly needed almost verywhere.

Agricultural Labour in England and Wales during February.

THE following local summaries give further details regarding agriultural conditions in the different districts of England and Wales:—

Northumberland, Durham, Cumberland, and Westmorland.—The supply of labour varies considerably. In a few districts the supply is very short, but generally there is an improvement, though the demobilised men are not always returning to farm work.

Lancashire and Cheshire.—The situation has somewhat improved, ut in some districts the shortage is still most acute.

Yorkshire.—The situation is easier on the whole, but there is still shortage in many places, especially of horsemen.

Shropshire and Stafford.—The supply of labour is still deficient, but he situation is improving as men are being released from the Army.

Derby, Nottingham, Leicester, and Rutland.—Skilled labour is still carce, but there is a gradual improvement as men are released from he Army.

Lincoln and Norfolk.—The supply of labour, especially skilled still deficient, but the position is slowly improving with the grac demobilisation of farm workers.

Suffolk, Cambridge, and Huntingdon.—Labour is still mostly defici but owing to the return of men from the Army, and the reduced dem on account of the weather, the deficiency has not been acutely fel

Bedford, Northampton, and Warwick.—On the whole the suppl labour is about sufficient, but skilled men, especially horsemen cowmen, are very difficult to obtain.

Buckingham, Oxford, and Berkshire.—The position is gradu improving, though the shortage still exists.

Worcester, Hereford, and Gloucester.—The supply of labour appe to have been adequate during the bad weather, and is improving i number of districts. There is, however, a good demand for ski workers.

Cornwall, Devon, and Somerset.—The scarcity has been less felt the whole, but there is still great need of skilled hands, especially ho men.

Dorset, Wiltshire, and Hampshire.—Labour is still deficient, tho there is enough for present requirements. There is a shortage of ca labour in several districts, but the general position is improving.

Surrey, Kent, and Sussex.—The situation is gradually improv but there is still a shortage, especially of skilled men.

Essex, Hertford, and Middlesex.—Labour is rather more plent in most districts, and is generally sufficient to meet present requireme Skilled workers are still reported to be scarce in some parts.

North Wales.—The supply of labour varies considerably. In so districts there is a sufficient supply for present requirements, whil others there is still a deficiency. Skilled workers are needed n especially.

Mid. Wales.—The release of men from the Army is easing the si tion, but there is still a shortage of skilled men in some districts.

South Wales.—The supply of labour though sufficient in some tricts, is very short in others, demobilised soldiers are in many c not returning to the farms.

AVERAGE PRICES of **British Wheat, Barley, and Oats** certain Markets during the Month of February, 1 1918, and 1919.

—	Wheat.						Barley.						Oats.				
	1917.		1918.		1919.		1917.		1918.		1919.		1917.		1918.		1
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.
London ...	77	5	72	9	73	4	64	9	60	4	61	9	49	2	57	0	5
Norwich ...	75	1	72	3	72	8	62	0	58	1	62	6	47	2	50	5	5
Peterborough	75	8	71	8	72	3	63	1	59	8	62	3	47	3	48	0	5
Lincoln ...	77	0	71	10	72	10	63	11	59	10	62	11	46	9	56	5	5
Doncaster ...	75	9	71	8	72	3	63	5	57	4	59	9	46	9	54	9	4
Salisbury ...	75	3	71	9	72	7	63	5	58	8	62	9	46	5	53	6	5

AVERAGE PRICES of British Corn per Quarter of 8 Imperial Bushels, computed from the Returns received under the Corn Returns Act, 1882, in each Week in 1917, 1918 and 1919.

Weeks ended (in 1919).	Wheat.						Barley.						Oats.					
	1917.		1918.		1919.		1917.		1918.		1919.		1917.		1918.		1919.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Jan. 4 ...	76	0	71	2	72	2	66	4	58	0	62	3	47	1	45	5	48	8
,, 11 ...	75	8	71	2	72	6	65	7	58	2	62	5	47	2	46	9	49	8
,, 18 ...	75	8	71	3	72	7	64	9	58	1	62	3	47	4	47	9	50	0
,, 25 ...	75	10	71	1	72	7	64	5	58	7	61	10	47	8	48	2	49	6
Feb. 1 ...	75	10	71	2	72	8	64	0	58	10	62	4	47	3	50	2	49	7
,, 8 ...	76	0	72	0	72	7	63	5	59	0	62	3	46	11	50	6	49	2
,, 15 ...	76	3	72	3	72	8	63	8	58	11	62	5	47	3	52	0	49	0
,, 22 ...	76	9	72	2	72	8	63	9	58	9	62	6	47	8	52	3	49	4
Mar. 1 ...	77	4	72	2	72	7	64	0	57	9	62	7	48	0	52	0	48	8
,, 8 ...	78	0	72	3	72	6	63	7	58	5	62	7	48	7	52	2	48	6
,, 15 ...	78	10	72	4	72	5	64	1	56	10	62	5	49	4	51	0	46	8
,, 22 ...	80	3	72	3			65	6	56	9			50	4	50	3		
,, 29 ...	81	5	72	4			71	10	56	7			51	10	48	10		
Apl 5 ..	84	4	72	11			69	11	56	7			55	1	49	10		
,, 12 ...	85	2	73	3			71	10	56	6			57	2	47	2		
,, 19 ..	84	10	73	3			70	6	56	6			59	8	47	0		
,, 26 ...	81	1	73	3			69	5	56	10			58	6	46	8		
May 3 ...	77	7	73	5			64	4	56	5			54	9	47	4		
,, 10 ...	78	0	73	5			64	11	56	6			55	2	47	6		
,, 17 ...	77	11	73	4			64	10	56	6			55	2	46	4		
,, 24 ...	78	0	73	3			64	9	56	6			54	11	47	8		
,, 31 ...	78	0	73	8			65	11	60	0			54	11	44	9		
June 7 ...	78	0	73	11			67	7	59	2			55	0	45	5		
,, 14 ...	78	2	74	3			75	6	57	9			55	1	45	7		
,, 21 ...	78	1	74	4			75	0	58	5			55	2	47	8		
,, 28 ...	78	3	74	4			73	11	57	10			55	1	46	4		
July 5 ...	78	1	74	4			69	5	61	7			55	2	46	10		
,, 12 ...	78	2	74	4			70	10	57	5			55	1	47	0		
,, 19 ..	78	3	74	3			72	1	60	5			55	2	45	4		
,, 26 ...	78	3	74	3			65	7	56	11			55	2	46	2		
Aug. 2 ...	78	2	74	3			73	6	57	1			55	0	45	10		
,, 9 ..	78	4	74	7			76	1	57	7			55	0	46	3		
,, 16 ...	78	7	74	2			68	11	61	4			55	6	55	11		
,, 23 ...	76	7	74	8			70	7	62	6			54	7	56	9		
,, 30 ...	72	1	74	8			60	4	60	1			49	0	57	11		
Sept. 6 ...	71	6	72	3			59	3	60	4			46	7	56	9		
,, 13 ...	70	7	72	5			57	2	60	1			45	0	49	2		
,, 20 ...	70	8	72	6			56	10	60	4			45	8	49	11		
,, 27 ...	70	6	72	7			58	5	60	3			44	7	50	3		
Oct. 4 ...	70	8	72	8			57	9	60	3			44	9	50	9		
,, 11 ...	71	0	72	6			58	5	60	3			44	5	51	6		
,, 18 ...	70	8	72	7			59	3	60	3			44	1	50	9		
,, 25 ...	70	10	72	5			60	1	60	3			43	0	50	5		
Nov 1 ...	70	4	72	4			59	11	60	3			42	4	50	8		
,, 8 ...	70	3	72	4			60	2	60	3			42	11	49	11		
,, 15 ...	70	3	72	5			60	2	60	3			43	0	49	10		
,, 22 ...	70	2	72	4			59	9	60	10			43	1	51	1		
,, 29 ...	70	2	72	3			59	3	62	2			44	6	50	4		
Dec 6 ...	70	7	72	4			58	7	62	6			43	5	51	4		
,, 13 ...	71	2	72	3			58	0	62	7			43	6	51	4		
,, 20 ...	71	1	72	4			57	7	62	3			44	2	50	5		
,, 27 ...	71	1	72	3			57	7	62	3			44	10	50	6		

NOTE.—Returns of purchases by weight or weighed measure are converted to Imperial Bushels at the following rates: Wheat, 60 lb.; Barley, 50 lb.; Oats, 39 lb. per Imperial Bushel.

PRICES OF AGRICULTURAL PRODUCE.

AVERAGE PRICES of LIVE STOCK in ENGLAND and WALES in February and January, 1919.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	February. First Grade.	February. Second Grade.	January. First Grade.	January. Second Grade.
	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.	per cwt. live weight.
FAT STOCK :—				
Cattle :—	s. d.	s. d.	s. d.	s. d.
Polled Scots	80 8	75 0	78 0	73 0
Herefords	80 2	75 0	77 7	72 5
Shorthorns	79 10	74 10	77 6	72 6
Devons	80 2	75 2	77 10	72 10
Welsh Runts	79 0	76 0	—	—
Fat Cows	74 9	66 10	72 8	64 8
	First Quality, per lb.*	Second Quality, per lb.*	First Quality, per lb.*	Second Quality, per lb.*
	d.	d.	d.	d.
Veal Calves	12½	11	12¼	10¾
Sheep :—				
Downs	14¼	14¼	14¼	14¼
Longwools	14¼	14¼	14¼	14¼
Cheviots	14¼	14¼	14¼	14¼
Blackfaced	14¼	14¼	14¼	14¼
Welsh	14¼	14¼	14¼	14¼
Cross-breds	14¼	14¼	14¼	14¼
	per score, live weight.	per score, live weight.	per score, live weight.	per score, live weight.
Pigs :—	s. d.	s. d.	s. d.	s. d.
Bacon Pigs	21 0	21 0	21 0	21 0
Porkers	21 0	21 0	21 0	21 0
LEAN STOCK :—	per head.	per head.	per head.	per head.
Milking Cows :—	£ s.	£ s.	£ s.	£ s.
Shorthorns—In Milk ...	51 18	38 14	54 12	41 10
,, —Calvers ..	45 16	34 11	47 6	37 10
Other Breeds—In Milk ...	45 6	37 4	45 3	36 4
,, —Calvers ...	—	—	30 0	29 0
Calves for Rearing	3 9	2 12	3 9	2 11
Store Cattle :—				
Shorthorns—Yearlings ...	16 10	13 7	16 5	13 6
,, —Two-year-olds...	25 17	21 17	25 15	21 17
,, —Three-year-olds	33 18	28 18	33 10	29 10
Herefords—Two-year-olds...	26 17	22 12	27 0	24 0
Devons— ,,	27 10	22 19	26 8	22 0
Welsh Runts— ,,	27 0	22 0	25 0	23 0
Store Sheep :—				
Hoggs, Hoggets, Tegs, and Lambs—	s. d.	s. d.	s. d.	s. d.
Downs or Longwools ...	68 10	55 4	67 3	54 6
Store Pigs :—				
8 to 12 weeks old	44 5	30 9	36 5	24 11
12 to 16 ,, ,, ...	79 10	59 4	70 0	52 9

* Estimated carcass weight.

NOTE.—The prices per lb. for sheep do not include the value of the skins, which during February made prices equivalent to an additional 1¾d. per lb. of the carcass weight for Downs and Cheviots, 2d. for Longwools, and 1½d. for Blackfaced and Welsh, and during January, 1¾d. per lb. for Downs, Longwools, Cheviots, and Cross-breds, and 1½d. for Blackfaced and Welsh.

In addition to the price quoted above for sheep per lb., sellers were entitled, under the Live Stock (Sales) Order, 1918, to charge an extra amount ranging from 2s. 6d. to 8s. 4d.

AVERAGE PRICES of PROVISIONS, POTATOES and HAY at certain MARKETS in ENGLAND in February, 1919.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Bristol.		Liverpool.		London.	
	First Quality.	Second Quality.	First Quality.	Second Quality.	First Quality.	Second Quality.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Butter :—	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.	per 12 lb.
British	—	—	—	—	27 0	—
	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.	per cwt.
Irish Creamery—Fresh	—	—	—	—	—	—
,, Factory ...	—	—	—	—	—	—
Imported (Controlled)	252 0	—	252 0	—	252 0	—
Cheese :—						
British—						
Cheddar	163 6	—	—	—	163 6	—
			120 lb.		120 lb.	
Cheshire	—	—	175 0	—	175 0	—
			per cwt.		per cwt.	
Canadian	163 6	—	163 6	—	163 6	—
Bacon :—						
Irish (Green) ...	189 6	—	189 6	—	189 6	—
Canadian (Green sides)	185 0	—	185 0	—	185 0	—
Hams :—						
York (Dried or Smoked)	—	—	—	—	—	—
Irish (Dried or Smoked)	—	—	—	—	—	—
American (Green) (long cut)	178 6	—	178 6	—	178 6	—
Eggs :—	per 120.	per 120.	per 120.	per 120.	per 120.	per 120.
British	—	—	—	—	49 2	47 11
Irish	50 0	—	48 6	47 9	46 4	45 0
American (Cold Stored)	40 0	—	40 0	—	38 0	—
Potatoes :—	per ton.	per ton.	per ton.	per ton.	per ton.	per ton.
Arran Chief	170 0	150 0	1[illegible]0 0	—	190 0	170 0
Edward VII.	205 0	170 0	200 0	175 0	191 0	180 0
Up-to-Date	200 0	170 0	155 0	151 6	—	—
Hay :—						
Clover	—	—	—	—	—	—
Meadow	—	—	—	—	—	—

AVERAGE PRICES OF DEAD MEAT at certain MARKETS in ENGLAND in February, 1919.

(Compiled from Reports received from the Board's Market Reporters.)

Description.	Quality.	Birmingham.	Leeds.	Liverpool.	London.	Manchester.
		per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.	per cwt. s. d.
BEEF:—						
English	1st	133 0	133 0	—	133 0	133 0
	2nd	133 0	133 0	—	133 0	133 0
Cow and Bull	1st	133 0	133 0	133 0	133 0	133 0
	2nd	133 0	133 0	112 0	116 6	112 0
Irish: Port Killed ...	1st	133 0	—	133 0	133 0	133 0
	2nd	133 0	—	133 0	133 0	133 0
Argentine Frozen—						
Hind Quarters ...	1st	148 0	148 0	148 0	148 0	148 0
Fore ,, ...	1st	118 0	118 0	118 0	118 0	118 0
American Frozen—						
Hind Quarters ...	1st	146 0	146 0	146 0	146 0	146 0
Fore ,, ...	1st	115 6	115 6	115 6	115 6	115 6
Canadian Frozen—						
Hind Quarters ...	1st	146 0	146 0	146 0	146 0	146 0
Fore ,, ...	1st	115 6	115 6	115 6	115 6	115 6
VEAL:—						
British	1st	112 0	112 0	112 0	112 0	112 0
	2nd	112 0	93 6	98 0	99 0	95 6
Foreign	1st	—	—	—	—	—
MUTTON:—						
Scotch	1st	140 0	140 0	140 0	140 0	140 0
	2nd	140 0	140 0	140 0	140 0	140 0
English	1st	140 0	140 0	—	140 0	140 0
	2nd	140 0	140 0	—	140 0	140 0
Irish: Port Killed ...	1st	—	—	140 0	—	140 0
	2nd	—	—	140 0	—	140 0
Argentine Frozen ...	1st	140 0	140 0	140 0	140 0	140 0
New Zealand ,, ...	1st	—	—	—	—	—
Australian ,, ...	1st	—	—	—	—	—
LAMB:—						
British	1st	—	—	—	—	—
	2nd	—	—	—	—	—
New Zealand	1st	—	—	—	140 0	—
Australian...	1st	—	—	—	—	—
Argentine...	1st	140 0	140 0	140 0	140 0	140 0
PORK:—						
British	1st	—	149 6	149 6	149 6	149 6
	2nd	—	—	—	—	—
Frozen	1st	—	—	—	149 6	—

DISEASES OF ANIMALS ACTS 1894 to 1914.

NUMBER OF OUTBREAKS, and of ANIMALS Attacked or Slaughtered.

GREAT BRITAIN.

(From the Returns of the Board of Agriculture and Fisheries.)

DISEASE.	FEBRUARY.		TWO MONTHS ENDED FEBRUARY.	
	1919.	1918.	1919.	1918.
Anthrax :—				
Outbreaks	16	24	33	54
Animals attacked	30	29	47	63
Foot-and-Mouth Disease :—				
Outbreaks	4	—	16	—
Animals attacked	19	—	89	—
Glanders (including Farcy) :—				
Outbreaks	—	1	—	3
Animals attacked	—	1	—	4
Parasitic Mange :—				
Outbreaks	671	668	1,390	1,279
Animals attacked	1,326	1,221	2,914	2,468
Rabies :—				
Number of cases	3	—	19	—
,, ,, Dogs affected ..	2	—	16	—
,, ,, other animals affected ...	1	—	3	—
Sheep-scab :—				
Outbreaks	70	67	151	161
Swine Fever :—				
Outbreaks	83	42	155	113
Swine slaughtered as diseased or exposed to infection ...	20	11	50	35

IRELAND.

(From the Returns of the Department of Agriculture and Technical Instruction for Ireland.)

DISEASE.	FEBRUARY.		TWO MONTHS ENDED FEBRUARY.	
	1919.	1918.	1919.	1918.
Anthrax :—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Glanders (including Farcy) :—				
Outbreaks	—	—	—	—
Animals attacked	—	—	—	—
Parasitic Mange :—				
Outbreaks	16	21	25	35
Sheep-scab :—				
Outbreaks	31	56	88	106
Swine Fever :—				
Outbreaks	4	1	9	2
Swine slaughtered as diseased or exposed to infection ...	25	13	38	14

The Weather in England during February.

District.	Temperature.		Rainfall.				Bright Sunshine.	
	Daily Mean.	Diff. from Average.	Amount.		Diff. from Average.	No. of Days with Rain.	Daily Mean.	Diff. from Average.
	°F.	°F.	In.	Mm.*	Mm.*		Hours.	Hours.
Week ending 8th Feb.:								
England, N.E. ...	33·4	−5·0	0·16	4	−5	3	1·9	−0·4
England, E.	31·6	−7·0	0·16	4	−5	2	2·7	+0·3
Midland Counties ...	31·8	−6·8	0·25	6	−6	2	1·7	−0·4
England, S.E. ...	32·7	−7·0	0·43	11	−3	3	2·1	−0·1
England, N.W. ...	34·1	−5·4	0·09	2	−15	2	1·0	−1·0
England, S.W. ...	35·0	−5·9	1·07	27	+7	3	1·3	−0·8
English Channel ...	40·4	−3·4	1·78	45	+29	5	1·7	−0·9
Week ending 15th Feb.:								
England, N.E. ...	32·7	−6·1	0·12	3	−6	2	2·9	+0·2
England, E.	31·6	−7·0	0·03	1	−10	2	3·7	+1·1
Midland Counties ...	29·8	−9·0	0·09	2	−10	2	3·3	+0·9
England, S.E. ...	34·1	−6·1	0·05	1	−13	2	4·9	+2·1
England, N.W. ...	34·3	−5·4	0·08	2	−18	2	3·8	+1·3
England, S.W. ...	35·7	−5·5	0·19	5	−15	3	4·4	+1·7
English Channel ...	40·1	−4·1	0·65	16	−3	3	4·2	+0·8
Week ending 22nd Feb.:								
England, N.E. ...	38·4	−0·3	1·33	34	+26	6	0·2	−2·6
England, E.	40·2	+1·2	2·00	51	+44	7	0·2	−2·8
Midland Counties ...	38·8	+0·1	2·08	53	+44	6	0·2	−2·4
England, S.E. ...	42·9	+2·8	1·70	43	+33	7	0·2	−2·8
England, N.W. ...	39·2	−0·5	0·89	23	+9	6	1·0	−1·8
England, S.W. ...	42·2	+1·4	2·54	65	+50	7	1·0	−2·0
English Channel ...	46·0	+1·9	2·20	56	+42	6	1·3	−2·2
Week ending 1st Mar.:								
England, N.E. ...	37·9	−1·0	0·29	7	−5	4	2·6	−0·3
England, E.	38·6	−0·7	0·33	9	−1	3	1·7	−1·2
Midland Counties ...	37·9	−1·4	0·04	1	−11	2	2·2	−0·4
England, S.E. ...	39·9	−0·5	0·28	7	−6	3	1·5	−1·6
England, N.W. ...	37·7	−2·1	0·07	2	−14	2	3·3	+0·6
England, S.W. ...	39·5	−1·8	0·24	6	−14	3	3·2	+0·2
English Channel ...	43·7	−0·3	0·65	17	+1	6	2·1	−1·6

* 1 inch = 25·4 millimetres.

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Articles or reports on the following subjects appear in the *Journal* each month or from time to time, and are not separately indexed:—Notes on Feeding Stuffs, Notes on Manures, Notes on Crop Prospects and Live Stock Abroad, Notes on the Weather, Notes on Agricultural Labour in England and Wales, Notes on Agricultural Conditions in England and Wales, Prices of Agricultural Produce, Outbreaks under the Diseases of Animals Acts, Prevalence of Animal Diseases on the Contitnent, Lists of Additions to the Board's Library, and Selected Contents of Periodicals.

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